

AUTOMOTIVE INDUSTRIES

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This Week

After Joseph Geschelin got through looking behind the scenes at the South Bend plant of Bendix he had a wonderful story and you will find it all profusely illustrated on the pages beginning with 300.

Studebaker is out with a new line of models. They have hypoid-gear final drives. The whole story starts on page 312.

Packard is out with the lowest priced models in its history. A new six and a new super-eight round out the line. Read the description on page 318.

Franklin to Olympic

New Motor Company Takes Over Syracuse Plant

Transfer of the Franklin automobile plant in Syracuse to the recently incorporated Olympic Motor Car Co., Inc., of Syracuse, was announced this week by Ben Wiles, Syracuse attorney, who had been conducting negotiations. Arthur J. Brandt, Detroit industrial engineer, Alfred R. Glancy, of Bloomfield Hills, Mich., formerly a vice-president of General Motors and John E. Williams, of Syracuse, are among the directors of the new company.

The Olympic Motor Car Co., Inc., filed a certificate of incorporation in New York State with H. P. Leonard, of Toledo, president of Franklin Motors, Inc., George W. Ritter, Toledo, vice-president of that concern, and Irving J. Davis, Syracuse, as directors. Mr. Davis is an associate of Mr. Wiles. It was stated officially that this new corporation was to serve as an intermediary in the transfer of the old Franklin plant to new interests.

The new Olympic company's stockholders have not yet held any meetings and it is said that the entire matter is still in the formative stage. It is not known whether Olympic will continue to be the operating concern when the plant is reopened or whether some other company or name will be used.

It was reported that the plant would be used to manufacture small low-priced cars and possibly trailers.

Month's Schedules Raised

Production of New Models Rushed to Take Advantage of Good Fall Sales' Prospects

By Harold E. Gronseth

The motor industry is gradually easing into its new model manufacturing program with four plants now assembling 1937 cars. Two more are scheduled to get under way by Sept. 15, and several are slated to start final assembly lines late this month. A number of plants are in active production on parts and motors, building up good sized banks on which to draw when everything is set for the heavy production anticipated later this fall.

The industry's September output will run somewhat heavier than was first indicated going over the 100,000 mark on the basis of present plans, thus topping the September production last year which totaled 92,728 cars and trucks. Starting schedules are generally very uncertain so that projections for the month will be subject to revisions from week to week. Some of the plants which expect to swing into production toward the end of the month are good sized producers and could raise the industry's total materially if they get under way as planned. By far the major portion of the current month's output, however, will be accounted for by the Ford Motor Co., which is still in production on 1936 cars and will continue to be until very near the end of September.

Recent forecast by a leading motor executive of a 10 per cent increase in motor vehicle production next year over the current year indicates the expectation of at least a 5,000,000 car year for 1937, since the 1936 output for the U. S. and Canada should be upwards of 4,500,000 units. By the end of August this year's production amounted to more than 3,300,000 units and with four months to go, three of which are heavy production months, it is highly probable that the 4,500,000 mark will be surpassed. Even if the industry does no better during the balance of the year than in the corresponding period last year when approximately 1,200,000 cars and trucks were built, that goal will be reached. The big 1937 projection particularly is significant in

view of the executive's record for conservatism in his forecasts. He predicted 3,600,000 units for 1935 when actual output was 4,119,000 units and for the current year it appears his early prediction will be topped by 350,000 units.

While formally the new model season opens with the national show in New York which starts this year on (Turn to page 296, please)

Packard Preview

4000 Meet at Factory to See New Cars; Macauley Sees 68% Gain

More than 4000 men, representing Packard sales and service organizations in every part of the U. S. and Canada as well as six foreign countries Thursday at Masonic Temple in Detroit were given a preview of the company's new models for 1937, including the new lower priced six-cylinder car.

Appearance of the new cars on the stage of the big Masonic auditorium climaxed a morning session of what is said to be one of the largest conventions ever held in the history of the automobile industry. It is to be concluded Friday with the largest driveway of cars ever held. Nearly 3000 Packards which are to be used as sales demonstrators (Turn to page 296, please)

Hupp's Plans

New Program to Be Presented at Stockholders' Meeting

Annual meeting of stockholders of Hupp Motor Car Corp. will be held in Richmond, Va., on Sept. 9 at which time the management expects to present a plan to rehabilitate the company's finances. Designing of new models has been completed by the engineering department and merchandising plans under which they are to be sold have received approval of distributors and dealers who have considered (Turn to page 297, please)

No More Speed Claims

AMA Asks Members to Eliminate Top Performance Publicity

The board of directors of the Automobile Manufacturers Association, by formal resolution, is recommending to all members that they eliminate all reference to vehicle top speeds in their advertising and publicity. Following is the resolution adopted by the board:

"The automobile industry will continue to build into its vehicles every safety factor proven by research and engineering. Obviously such a program requires that the industry, to provide

desired margins of safety, must build into vehicles, reserves of performance that should not be used in normal operation.

"Present day top speeds represent that extra margin of safe performance essential to normal operating speeds.

"In line with the automobile industry's highway safety policies, the board of directors of the Automobile Manufacturers Association recommends to its members that they eliminate from their advertising and publicity, all reference to vehicle top speeds."

Toledo Hails W-O Reopening

Chamber of Commerce Dinner Celebrates Court Approval of Plans, Votes Testimonial to David R. Wilson

The new Willys-Overland Motors, Inc., is shaping its plans to take over

operating property at the Willys-Overland plant in Toledo and Los Angeles on Oct. 1. Land title work, stock subscriptions, and other details of the property transfer are scheduled to be completed by that time. Judge George P. Hahn, in Federal court, after hearing all phases of the reorganization plan as proposed by Empire Securities, Inc., gave his approval. He summarized his opinion:

"I find that the debtor is insolvent, that the plan complies with the provisions of Section 77-B of the bankruptcy act, that the plan is feasible, is fair and equitable, and does not discriminate unfairly in favor of any class of creditors or stockholders."

(Turn to page 323, please)

Lincoln, Buick, Cadillac Lead Gains

New Passenger Car Registrations

	July 1936	June 1936	July 1935	Seven Months		Per Cent Change, 7 Mos. 1936 over 1935	Numerical Change, 7 Mos. 1936 over 1935	Per Cent of Total Seven Months	
				1936	1935			1936	1935
Chevrolet	99,678	102,949	71,226	627,978	383,390	+ 64.0	244,588	28.41	21.94
Ford	81,703	80,527	83,203	497,480	571,671	- 13.0	-74,191	22.50	32.72
Plymouth	51,784	54,009	40,674	311,774	253,731	+ 22.9	58,043	14.10	14.52
Dodge	25,838	26,841	18,951	156,431	115,874	+ 35.2	40,557	7.08	6.63
Oldsmobile	19,602	21,556	15,632	128,344	96,072	+ 33.9	32,272	5.81	5.50
Pontiac	18,693	19,537	15,208	110,542	90,332	+ 22.3	20,210	5.00	5.17
Buick	15,482	16,174	6,700	97,482	40,776	+ 139.0	56,706	4.41	2.33
Terraplane	8,407	8,802	5,454	51,344	34,295	+ 49.5	17,049	2.32	1.96
Studebaker	5,457	7,187	3,913	40,921	24,989	+ 63.8	15,932	1.85	1.43
Chrysler	5,725	5,915	4,542	36,352	28,594	+ 27.0	7,758	1.64	1.64
Packard	5,070	5,518	4,242	33,773	17,462	+ 93.5	16,311	1.53	1.00
De Soto	5,462	5,290	3,057	27,041	17,317	+ 56.1	9,724	1.23	.99
Nash	2,153	2,258	2,081	14,223	10,414	+ 37.0	3,809	.64	.60
Hudson	1,849	1,987	2,081	14,164	13,728	+ 3.2	436	.64	.79
La Fayette	2,315	2,310	1,872	13,118	9,614	+ 36.7	3,504	.59	.55
Graham	1,925	1,837	1,763	10,417	10,039	+ 4.0	378	.47	.57
Lincoln	1,322	1,243	129	7,848	1,059	+641.0	6,789	.36	.06
Willys	1,513	1,539	1,157	7,642	6,030	+ 26.8	1,612	.35	.35
La Salle	1,024	1,097	1,101	7,285	6,749	+ 7.9	536	.33	.39
Cadillac	1,018	1,035	457	7,092	3,122	+127.4	3,970	.32	.18
Reo	354	361	365	2,280	2,344	- 2.5	-64	.10	.13
Auburn	151	167	522	1,440	3,533	- 59.2	-2,093	.07	.20
Hupmobile	92	119	727	1,434	5,062	- 71.6	-3,628	.06	.29
Cord	148	162	716	477	716	-	716	.03	.03
Pierce-Arrow	70	59	87	477	465	+ 2.8	12	.02	.03
Miscellaneous	675	954	34	2,973	452	-	2,521	.14	.03
Total	357,490	360,423	285,178	2,210,571	1,747,114	+ 26.6	463,457	100.00	100.00
Chrysler Corp.	88,789	92,045	67,224	531,598	415,516	+ 28.1	116,082	24.05	23.78
Ford and Lincoln	83,025	81,770	83,332	505,328	572,730	- 11.7	-67,402	22.66	32.78
General Motors	155,497	162,348	110,324	978,723	620,441	+ 57.9	358,282	44.27	35.51
All Others	30,179	33,260	24,298	194,922	138,427	+ 40.8	56,495	8.82	7.93

New Truck Registrations

	July 1936	June 1936	July 1935	Seven Months		Per Cent Change, 7 Mos. 1936 over 1935	Numerical Change, 7 Mos. 1936 over 1935	Per Cent of Total Seven Months	
				1936	1935			1936	1935
Chevrolet	21,553	19,045	18,608	134,977	102,804	+ 31.7	32,173	35.13	33.67
Ford	18,639	16,930	18,073	115,033	115,387	- 0.3	-354	29.94	37.79
Dodge	8,153	7,777	5,336	51,771	34,032	+ 52.1	17,739	13.48	11.15
International	7,167	6,151	5,308	41,833	29,739	+ 41.0	12,094	10.89	9.74
G. M. C.	3,501	2,820	857	14,836	5,789	+157.0	9,047	3.86	1.90
Diamond T.	846	660	593	4,683	3,886	+ 20.3	797	1.22	1.27
White	529	464	233	3,160	1,734	+ 82.5	1,426	.82	.57
Reo	382	325	439	2,305	3,004	- 23.2	-699	.60	.98
Mack	492	427	147	2,029	875	+132.0	1,154	.53	.29
Studebaker	361	320	219	1,864	1,224	+ 52.5	640	.48	.40
Plymouth	320	324	129	1,834	304	+505.0	1,530	.48	.10
Federal	280	287	202	1,711	1,147	+ 49.3	564	.44	.38
Willys-Overland	270	239	298	1,412	1,156	+ 22.2	256	.37	.38
Terraplane	242	262	86	1,257	434	+190.0	823	.33	.14
Brockway	207	137	114	1,000	640	+ 57.2	360	.26	.21
Indiana	219	135	103	984	246	+300.0	738	.26	.08
Stewart	132	113	85	693	412	+ 68.2	281	.18	.13
Autocar	137	96	99	683	497	+37.1	186	.18	.16
Divco	52	117	33	624	179	+248.2	445	.16	.06
F. W. D.	32	24	24	226	121	+ 87.0	105	.06	.04
Sterling	22	28	19	116	105	+ 10.0	11	.03	.03
Twin-Couch	4	9	23	82	77	+ 6.7	5	.02	.02
Miscellaneous	155	161	215	1,064	1,514	- 39.6	-450	.28	.51
Total	63,695	56,851	51,243	384,177	305,306	+ 26.0	78,871	100.00	100.00

Carnegie Hall to House General Motors Concerts

Carnegie Hall in New York will be the home of the General Motors Concerts when these musical events are resumed on Sept. 13. That date will mark the beginning of the fourth season of these concerts.

The sponsored concerts, according to the announcement, will follow the same pattern as in the past, featuring the General Motors Symphony Orchestra. Erno Rapee, noted symphony orchestra conductor, will again be the permanent leader for the series, and will again be host to several of the most eminent symphonic conductors of our time, who will appear as guest conductors on occasion throughout the series.

Automotive Plants' Safety Progress

*Chrysler and G. M. Head National Safety Council's
Roll of Factories with Improved Records*

By George Applegren

Workers in the automobile industry suffered 19.68 lost time accidents in 1935 for each million man-hours of work, according to the year's report that has just been made by the National Safety Council. The report gives the experience of 56 plants in the industry, employing a peak of 140,277 workers, and represents a total of 266,606,000 man hours worked.

The tabulation made by the council includes 30 major industries with the automobile industry in 23rd place in point of accident frequency, and in 14th place on the basis of severity of accidents.

Although the report for the automobile industry shows a commendable decline from the 1934 experience, it is still considerably over the average for all industries on the frequency basis, which for all 30 industries averaged only 14.02.

In the severity tables a more pleasing picture is presented. Here the automobile industry was below the average, with 1.11 against 1.58, or 30 per cent lower. Since 1926, the year in which the council started keeping its records in their present form, the frequency of disabling mishaps in automobile plants has declined 37 per cent, compared to 61 per cent for all industries. In the same time, severity of accidents in the automobile class has declined nine per cent, against a general decline of 43 per cent.

The council's report calls special attention to the fact that "small organizations had the best 1935 records" and
(Turn to page 324, please)

year the association has used sales records of 40 manufacturers distributed evenly over the country, instead of reports from only 17 as before. An added feature of the booklet is a discussion of trends in the use of automobiles.

The booklet gives valuable information on prices and consumption of raw materials in the battery industry as well as statistics covering manufacture and sales of batteries.

:SLANTS:

NINE YEARS OLD—The ninth anniversary of the inauguration of Air Express in America was celebrated Sept. 1 by the 23,000 express offices of Railway Express Agency in this country, and by the hundreds of offices of Pan American Airways, which are by agreement part of the agency's vast air express system in the United States, Mexico, the West Indies, Central and South America, the Philippine and Hawaiian Islands, Wake, Midway and Guam. The first shipment consisted of 12 air express packages, flown in an open plane from New Brunswick, N. J., to Cleveland. Now the yearly volume is nearly 500,000 packages.

BADAUDS—Those New York loiterers who are so fond of watching street activities will have a busy time around the Grand Central Palace just before

the National Automobile Show opens Nov. 11. This year the fourth floor will be taken over for exhibits, demand from the booming tourist trailer industry being responsible. But since the Palace's elevators are inadequate to hoist the houses-on-wheels, a hole big enough to let them in will be knocked out of the fourth floor wall and an ingenious lift contrived by attaching a huge packing case, open at both ends, to a cable outside the building. The trailers will be run into this improvised elevator, raised to the wall opening, and rolled to their proper places. Decorations will convert this floor into an outdoor scene, providing a fitting national park atmosphere for the trailer exhibits.

PICKET BOATS—A fleet of 45-ft. high-speed picket boats, each powered by four Ford V-8 engines adapted for marine use, to patrol the coast of the British Isles has been ordered by the British Admiralty from a Portsmouth firm. A trial run of the first of these boats to be completed gave an average speed of 21 knots on a run of 260 nautical mi. through heavy seas. The engines, as adapted for marine use, develop 75 hp. and can give a maximum speed of 25 knots, it is claimed. The machinery occupies only one-third of the space usually required in steam-driven boats of this size and the service speed is approximately three times as great. The boats are armed with a machine gun forward, depth-bomb dropping gear amidships and mine-sweeping gear aft.

SHORT-HAUL—Comes a new claimant for championship honors. Eastern Air Lines claims for its Chevrolet truck used for refueling at Jacksonville, Fla., the world's short-haul record. After 12
(Turn to page 325, please)

July Retail Financing 58% Above Last Year

The dollar volume of retail financing of new passenger automobiles shows an increase of 58.5 per cent for the month of July as compared with July, 1935, and an increase of 72 per cent compared with July, 1934, according to preliminary estimates by the Department of Commerce. As compared with June, 1936, there was a decrease of 8 per cent.

The aggregate volume for the first seven months of this year was 61 per cent above the first seven months of 1935 and 90 per cent higher than for the corresponding period of 1934.

Battery Yearbook

The National Battery Manufacturers Association has published its second statistical year book, "The Battery Industry at a Glance," 1936 edition. This



Judge George P. Hahn, in Federal Court, signs the order approving the Willys-Overland reorganization plan. At the table, from left to right, are: Robert F. Young, Dayton; John J. Kendrick, Harold W. Fraser, George W. Ritter, Ward M. Canaday, John Wallace, New York, representing underwriters; Alfred H. Phillips, his attorney; and Sigmond Sanger.

26% Registration Gain for 7 Months

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—July

UNITS				ESTIMATED DOLLAR VOLUME*						
	1936	1935	Per Cent Change	Per Cent of Total		1936	1935	Per Cent Change	Per Cent of Total	
				1936	1935				1936	1935
Chevrolet, Ford and Plymouth.....	233,145	195,103	+ 19.6	65.35	68.42	\$140,700,000	\$116,600,000	+ 20.7	57.55	60.57
Others under \$750.....	53,966	42,723	+ 26.2	15.12	14.98	38,800,000	30,300,000	+ 28.0	15.87	15.74
\$751-\$1000.....	55,210	37,153	+ 49.0	15.47	13.03	46,000,000	31,400,000	+ 46.5	18.81	16.31
\$1001-\$1500.....	12,535	8,905	+ 41.0	3.51	3.12	14,300,000	10,300,000	+ 39.0	5.85	5.35
\$1501-\$2000.....	904	166	+ 445.0	.25	.06	1,600,000	300,000	+ 433.3	.65	.16
\$2001-\$3000.....	708	814	- 13.0	.20	.29	1,800,000	2,300,000	- 21.7	.74	1.19
\$3001 and over.....	347	297	+ 16.9	.10	.10	1,300,000	1,300,000	None	.53	.68
Total.....	356,815	285,161	+ 25.3	100.00	100.00	\$244,500,000	\$192,500,000	+ 27.0	100.00	100.00
Miscellaneous.....	675	34								
Total.....	357,490	285,195	+ 25.4							

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—Seven Months

UNITS				ESTIMATED DOLLAR VOLUME*						
	1936	1935	Per Cent Change	Per Cent of Total		1936	1935	Per Cent Change	Per Cent of Total	
				1936	1935				1936	1935
Chevrolet, Ford and Plymouth.....	1,437,232	1,208,792	+ 18.0	65.11	69.21	\$867,100,000	\$745,000,000	+ 16.9	56.93	61.75
Others under \$750.....	319,212	248,814	+ 28.1	14.46	14.24	229,900,000	177,700,000	+ 29.5	15.09	14.73
\$751-\$1000.....	349,755	228,778	+ 53.0	15.84	13.10	291,100,000	193,700,000	+ 50.5	19.12	16.05
\$1001-\$1500.....	87,075	47,637	+ 82.8	3.94	2.73	99,700,000	56,400,000	+ 77.0	6.55	4.67
\$1501-\$2000.....	6,642	4,572	+ 45.1	.30	.26	11,500,000	7,700,000	+ 49.5	.76	.64
\$2001-\$3000.....	4,894	5,443	- 10.0	.22	.31	12,600,000	15,000,000	- 16.0	.83	1.24
\$3001 and over.....	2,792	2,647	+ 5.3	.13	.15	10,900,000	11,100,000	- 1.7	.72	.92
Total.....	2,207,602	1,746,683	+ 26.2	100.00	100.00	\$1,522,800,000	\$1,206,800,000	+ 26.1	100.00	100.00
Miscellaneous.....	2,973	452								
Total.....	2,210,575	1,747,135								

*All calculations are based on list price F.O.B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volume for the different models is then consolidated by price classes.

"Safe Drivers" Meet

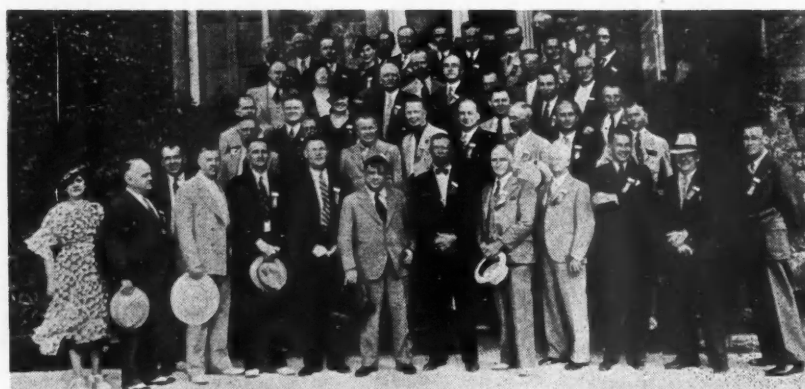
Conference Held in New York Votes to Form Permanent League

Reaching New York without accident as they added a few more thousands of miles to the aggregate of 25,000,000 miles they have driven without a single mishap, the 49 representative "safe drivers" from each of the 48 states and the District of Columbia met this week for the first national Safe Driver Conference at the Waldorf-Astoria Hotel.

The delegates, brought together by the Commercial Investment Trust Safety Foundation and the American Automobile Association, agreed that to be effective a safety campaign must win the support of the majority of motorists. At the end of the conference they voted to form a permanent Safe Drivers League to cooperate with existing safety groups in all sections of the country. They also decided to make the selection of outstanding "safe drivers" an annual event, basing the choice on safe-driving practices during the year, instead of on past records.

John W. Darr, trustee of the founda-

tion, presided at the meeting. The best educational means of making the public safety-conscious and the methods by which the delegates could further the cause of safe driving were the chief topics considered. It was the hope of the foundation, he stated, that the conference would impress drivers through-



"Safe drivers", from each of the 48 states and the District of Columbia, were received by Mayor F. H. LaGuardia during their conference in New York this week.

out the nation with the possibility of improving their own records. The foundation is offering a grand award of \$5,000 to the person who contributed most toward arousing the public to reduce accidents during the year and an additional \$5,000 in various prizes for safety essays, editorials, cartoons, etc.

Month's Schedules Raised

(Continued from page 293)

Nov. 11, actually the selling season for 1937 cars already has been launched with the announcement over the weekend of the new Packard lines. Studebaker is due in a week. Others will follow in rapid succession during October. Although many may withhold formal introduction until late in the month or near show time, spot announcements at various points will be more prevalent this year because of the shortage of new cars developing in the field. It is expected that factories will rush new models promptly to dealers that are cleaned up on 1936 lines and permit local introductions.

Packard's Preview

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in all parts of the country are scheduled to leave the city during the day.

Visitors to the conventions were addressed during the meeting by Alvan Macauley, president, M. M. Gilman, vice-president and general manager, and sales executives of the company.

Mr. Macauley told the meeting he was confident of still better things for all business in America during 1937. He was particularly optimistic about the business outlook of the automobile industry for next year. Mr. Macauley said that the company had set a goal for next year calling for an increase of 68 per cent in sales. He called attention to the fact that the average age of Packard distributorships is 15 years. The Packard labor situation, he said, is the best in the industry.

A Packard 120 De Luxe line carrying three body styles and priced between the 120 Standard and the Super Eight was

announced, as well as a seven passenger line with two body types mounted on a special 138-in. wheelbase using the 120 chassis.

Based on 3,500,000 passenger car production by the industry, Packard's projection for next year calls for 133,000 units, Mr. Macauley stated. Approximate distribution of this production among the various Packard lines is as follows: 1000 Twelves, 7000 Super Eights, 50,000 One Twenties and 70,000 new sixes.

The twelve cylinder line will show a reduction in base price of \$400 from last year's models. The Super Eight will be \$50 less than last year's eight. The 120 will range from \$945 to \$1600. The new six ranges from \$795 to \$910. The 138 seven-passenger sedan will list at \$1690 and the limousine at \$1840. One body type of the 120 de luxe line lists at \$1270.



M. D. ARCHANGELI has been appointed to the position of sales manager, Saginaw division, Wilcox-Rich Corp., effective at once. Mr. Archangeli has been connected with the corporation since 1921 and since 1927 has been with the sales department.

R. S. COLE, who was for many years vice-president in charge of sales of the Hupp Motor Car Corp., Detroit, is now president of the Brennan-Cole Corp., 11 West 42nd Street, New York, with show-rooms at 1860 Broadway, which has taken the New York regional representation of the Covered Wagon Co., Mt. Clemens, Mich.

L. H. MESKER, 920 Hollenden Hotel, Cleveland, has been appointed sales agent of the Reed-Prentice Corp., Worcester, Mass.

FRANCIS M. HIGGINS, market research analyst of the Four Wheel Drive Auto Co., has been appointed manager of advertising, to succeed W. M. Hanson, who has resigned.

C. A. CLARK, formerly regional business manager at Oakland, Calif., has been appointed assistant manager of the dealer finance and business management department in the central office of the Chevrolet Motor Co., W. E. Holler, vice-president and general sales manager of that company announced this week.

JAMES A. JACKSON has been elected a director of the Reynolds Spring Co. Mr. Jackson was for many years a vice-president of the National City Bank of New York, leaving that institution the first of this year to join the banking house of Lazard Freres & Co., Inc., New York, where he is a vice-president and director.

DUDLEY M. CARSON, formerly in charge of publicity for Cadillac-LaSalle, Dow Chemical and Champion Spark Plug, recently resigned from McManus, John & Adams, Inc., to become vice-president of Denham & Co., who will handle publicity activities of the Graham-Paige Motors Corp. for the United States Advertising Corp., advertising counsel for Graham-Paige.

S.A.E. to Draw Up Standards for Tourist Trailer Hitches

The standards department of the Society of Automotive Engineers has mailed a questionnaire on hitches for tourist trailers to car, trailer and parts manufacturers, and hopes to have standards drawn up for these before the end of the year. The study was undertaken at the suggestion of a large car manufacturer. Standards for hitches will apply both to the towing vehicle and to the trailer.

Reo to Specialize on Commercial Car Lines

"Rapidly expanding markets for new types of commercial vehicles demand immediate expansion of existing service and manufacturing facilities, and have influenced the management of Reo Motor Car Co., Lansing, Mich., in its decision to concentrate all sales and manufacturing efforts exclusively on commercial cars," D. E. Bates, president, said in announcing the new policy Thursday. He added that Reo's strong financial position, as reflected in ratio of quick assets to liabilities, makes possible a broad program. Truck and bus lines will immediately be enlarged through the addition of new models.



John A. C. Warner, general manager of the S. A. E., left New York recently by air for the Pacific Coast where he will make preliminary plans for the S. A. E.'s first aircraft production meeting in Los Angeles, Oct. 15-17

Hupp's Plans

(Continued from page 293)

them, according to notices of the meeting sent to stockholders.

"The company now finds itself in the position of having discharged practically all its liability to its merchandise creditors," the letter states.

7 Months' Exports Up 5%

Exports and Imports of the Automotive Industry for July and Seven Months Ended July, 1936-1935

	JULY				SEVEN MONTHS ENDED JULY			
	1936		1935		1936		1935	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Motor vehicles, parts and accessories.....		\$ 16,915,076		\$ 19,371,531		\$ 149,738,797		\$ 142,816,279
PASSENGER CARS								
Passenger cars and chassis.....	12,531	6,576,588	14,752	8,538,306	112,997	63,801,548	110,284	61,924,448
Low price range \$850 inclusive.....	11,855	5,832,137	13,504	7,396,307	103,899	53,582,413	102,092	53,118,888
Medium price range over \$850 to \$1,200.....	549	534,387	898	832,150	7,413	7,139,501	6,115	5,782,230
\$1,200 to \$2,000.....	94	137,369	70	105,772	1,144	1,689,817	848	1,297,061
Over \$2,000.....	33	72,695	55	148,939	541	1,389,817	543	1,439,296
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total).....	9,725	4,947,973	10,274	5,063,595	67,435	34,034,552	56,569	28,986,783
Under one ton.....	1,683	661,258	818	309,949	10,696	4,050,544	4,778	1,631,555
One and up to 1½ tons.....	6,519	2,964,896	7,732	3,440,013	44,302	20,168,577	42,172	18,828,204
Over 1½ tons to 2½ tons.....	1,115	835,286	1,469	1,015,617	8,766	6,293,854	7,967	6,006,315
Over 2½ tons.....	195	350,858	174	256,758	1,885	2,697,019	1,300	2,220,616
Bus chassis.....	203	135,675	19	25,284	1,786	824,828	174	209,032
PARTS, ETC.								
Parts except engines and tires.....		\$ 2,085,865		\$ 2,462,725		\$ 27,472,386		\$ 30,277,123
Automobile unit assemblies.....		2,300,774		2,651,962		15,491,986		15,342,615
Automobile parts for replacement (n.e.s.).....		196,867		186,401		1,846,990		1,699,476
Automobile accessories (n.e.s.).....		362,980		327,845		2,556,094		2,332,935
Airplanes, seaplanes and other aircraft.....	67	1,839,270	16	223,176	294	6,416,369	198	4,700,145
Parts of airplanes, except engines and tires.....		749,057		515,517		3,100,270		2,953,854
INTERNAL COMBUSTION ENGINES								
Stationary and Portable.....								
Diesel and semi-Diesel.....	55	126,620	22,462	81,462	255	749,967	169	481,117
Other stationary and portable.....								
Not over 10 hp.....	964	58,360	1,095	54,212	6,788	415,798	5,951	326,054
Over 10 hp.....	216	904,474	203	103,474	1,404	558,317	879	492,764
Automobile engines for:								
Motor trucks and buses.....	1,998	196,012	245	30,849	14,956	1,440,234	2,455	363,121
Passenger cars.....	3,229	234,410	1,154	78,341	32,957	2,258,288	18,578	1,186,765
Engines and aircraft.....	81	449,273	43	169,853	409	1,902,768	295	1,076,752
Accessories and parts (carburetors).....		164,339		122,701		1,162,957		972,073
IMPORTS								
Automobile and chassis (durable).....	57	44,578	51	33,437	414	214,391	310	166,405

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

There was no interruption in the upward trend of general business last week. Gains in retail trade were reported, ranging from two to five per cent above the levels of the preceding week and from 12 to 15 per cent above those a year ago. Wholesale trade was from 18 to 25 per cent above the figures a year ago. High temperatures continued to prevail in the central valleys, and rain was inadequate.

Business Index Higher

The Guaranty Trust Co.'s index of business activity for July stands at 89.0 as against 85.4 for the month before and 70.8 for the corresponding period last year. The company's index of wholesale commodity prices on Aug. 15 was 58.9 as against 55.9 a month earlier and 52.9 a year earlier.

Carloadings Steady

Railway freight loadings during the week ended Aug. 22 amounted to 734,973 cars, which marks a decline of 1524 cars below those in the preceding week, a gain of 109,199 cars above those a year ago, and an increase of 128,056 cars above those two years ago.

Power Output Up 15.5%

Production of electricity by the electric light and power industry in the United States during the week ended Aug. 22 advanced to a new high record and was 15.5 per cent above the level in the corresponding period last year.

Exports Slightly Lower

Export trade during July was four per cent below that in June, while imports increased about two per cent. As a rule, both exports and imports show a small seasonal decline during June. Exports were three per cent above those a year ago, and imports were nine per cent higher.

Lumber Orders Exceed Production

Lumber production during the week ended Aug. 15 was about 70 per cent of the 1929 average and was close to the high weeks of this year. For the first time in four months new orders were in excess of production. Shipments were nearly the lowest since last March.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended Aug. 29 stood at 83.8, as compared with 84.1 the week before and 84.0 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Aug. 26 showed an increase of \$1,000,000 in holdings of discounted bills. Bills bought in the open market and government securities remained unchanged. Money in circulation remained unchanged, and the monetary gold stock increased \$17,000,000.

any of their plants for the time being.

Prevailing market prices for scrap continue to come in for wide mention as justifying higher prices for finished steel. These analysts completely overlook the fact that a very important part of the scrap consumption of steel mills is made up of the discard, crops and crop ends that result in the rolling and forging operations of the mills themselves. Moreover, normal conditions in the market for "outside" scrap always return following the aloofness of steel mill purchasing agents which speculative flurries engenders.

Pig Iron—Talk of impending price advances persists, although in some markets a rise of only 50 cents a ton, instead of \$1, is now predicted. Representative tonnage business from automotive foundries is still in the stage of preliminary negotiations.

Aluminum—The undertone of the secondary aluminum market is a shade stronger, most of the producers having raised their buying prices for scrap. The primary market is firm and unchanged.

Copper—Demand for some of the products of the copper and brass fabricating mills is running so high that many of them are behind in filling their orders. This state of affairs is reflected in better takings of copper, the market for electrolytic being firm at 9½ cents.

Tin—Quite a little business with automotive consumers was reported to have been done by dealers and importers early this week. The market for spot Straits tin ruled higher at the beginning of the week, when 43¼ cents was quoted, denoting an advance of ¾ cents.

Lead—Storage battery manufacturers are conservative in covering their nearby requirements, very little metal having been contracted so far for October delivery. The market is unchanged and steady.

Zinc—Heavy sales resulted when producers permitted consumers to cover over the remainder of the year before a fractional advance was put into effect.

40 Years Ago

—with the ancestors of
AUTOMOTIVE INDUSTRIES

Automotive Metal Markets

Fourth Quarter Steel Price Uncertainty Bringing in Heavy Tonnage Commitments

By William Crawford Hirsch

Although some steel company executives have flatly declared themselves against a mark-up of fourth quarter prices, the issue continues to be the outstanding topic of discussion in the steel market. It is pointed out that the traditional custom of announcing prices for an ensuing quarter at the beginning of the preceding quarter's last month is no longer sacrosanct and that there is nothing to prevent steel sellers from changing their prices at any time they see fit, so long as it is done openly and competitors as well as consumers fully informed as to the extent and effective date of price changes.

The prevailing uncertainty serves just as well as would definite announcement of an impending price rise to "smoke out" considerable business. Convinced that if prices change at all it

will be in an upward direction, buyers are committing themselves more freely as to tonnages, although there is little evidence of actual stocking of steel by either parts makers or automobile manufacturers. An entirely unsubstantiated rumor has it that sheets will be the first description of steel to be marked up. Quite a little of the current ingot production is ascribed to a program of stocking of primary forms of steel by the mills, so that there may be no hitch in the supply of billets, sheet bars, etc., to finishing mills later on.

While one of the non-integrated steel producers has granted a wage increase of three cents an hour to 1500 workers, several of the leading steel companies have let it be understood that there will be no increase in wage scales at

The "Motor House"

A correspondent of one of our English contemporaries suggests that the motor might find a field of usefulness in its application to what for lack of a better term might be called nomadics. After assuring us that a gentleman of responsibility and discretion has ordered for himself a motor house in which he proposed to range the country in search of a change and recreation, the contributor passes on to a serio-comic consideration of this novel idea. Two-storied motor houses he thinks rather unsafe for touring. . . . As a means for escaping ground rent he believes the motor house will prove a disappointment, unless its owner keeps forever in motion on the road. It is quite possible that a limited demand may spring up in England for capacious vehicles suitable for touring or camping out parties—"caravaning," as it is termed there.

—From *The Horseless Age*, September, 1896.

Production Lines

Drilling and Surfacing

Fred H. Colvin and Frank A. Stanley have just completed the second volume of their new series of books on machinery and related metal cutting operations. The first in the series was "Turning and Boring Practice"; the new volume just off the press is entitled, "Drilling and Surfacing Practice." It covers principally the operations of drilling, reaming, tapping, planing, shaping, slotting, milling, and broaching, the latter section including the new and fast moving technique of surface broaching. The book is replete with practical illustrations from important metal cutting establishments and includes, as well, many new tables and data sheets. It's a practical volume for the novice as well as the engineer and production man. The first edition runs 431 pages, profusely illustrated. Price \$4. Published by McGraw-Hill.

Single Point

A prominent drilling machine manufacturer is now demonstrating a single-point boring machine for cylinder bores, using a c-t-c tool point. The machine is a massive vertical tool with variable hydraulic feed and electrical controls of the operating cycle. The process is being recommended to eliminate finish boring and rough honing. To assure accuracy of the bored hole, they use a massive spindle for rigidity, and in addition, they have four retractable pilots backed by spring pressure that bear against the cylinder wall after a pre-determined depth has been reached. This not only serves as a pilot but cushions vibration, as well. Spindle rotation stops at the end of the stroke and the block fixture is so arranged that it may be shifted slightly to one side to afford clearance for the tool on the upward stroke. Detroit production men are getting the first crack at this machine. If interested let us know and we'll give you further details.

Crank Broach

About 18 months ago, one of the well-known machinery builders developed a crankpin finishing machine using a surface broaching attachment for doing the finishing. The machine went into experimental production for one of the largest motor manufacturers.

Now we understand that an important car builder has installed this equipment, in its improved form, for 1937 production.

Automatic Shift

There is talk about the industry of the possibility that one or two makes of

1937 cars will be equipped with an automatic transmission. Our information is based on hearsay, from usually authoritative sources, so that there may be something in it.

Fifty Years

This Fall will mark the 50th anniversary of the birth of electric resistance welding. It marks the time 50 years ago when Dr. Thomson, then a young man, produced the first crude machine for making spot-welds. And the event is to be fittingly celebrated later this year.

(Turn to page 327, please)

Calendar of Coming Events

SHOWS

Automobile Salon, Oriental Fair, Lwow, Poland	Sept. 5-15
International Automobile Section, 7th Levant Fair, Bari, Italy	Sept. 6-21
30th Automobile Salon, Paris, France, Oct. 1-11	
Olympia Motor Show, London, England, Oct. 15-24	
Czechoslovakia, 26th International Automobile Exposition, Prague	Oct. 16-25
9th International Automobile Salon, Milan, Italy	November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7	
Canadian National Automobile Show, Toronto	Nov. 7-14
National Automobile Show, Grand Central Palace, New York	Nov. 11-18
Philadelphia Automobile Show	Nov. 12-19
Scottish Motor Show, Glasgow	Nov. 13-21
International Aviation Show, Paris, France	Nov. 13-29
Columbus Automobile Show	Nov. 14-20
Boston Automobile Show	Nov. 14-21
Buffalo Automobile Show	Nov. 14-21
Chicago Automobile Show	Nov. 14-21
Detroit Automobile Show	Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21	
Cincinnati Automobile Show	Nov. 15-21
St. Louis Automobile Show	Nov. 15-22
Pittsburgh Automobile Show	Nov. 16-21
Brooklyn Automobile Show	Nov. 21-28
Cleveland Automobile Show	Nov. 21-28
Montreal Automobile Show	Nov. 21-28
Kansas City Automobile Show	Nov. 21-29*
Milwaukee Automobile Show	Nov. 22-29
Baltimore Automobile Show	Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium	Nov. 28-Dec. 9
Peoria Automobile Show	Nov. 30-Dec. 5*
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City	Nov. 30-Dec. 5
First International Consumers Petroleum Exposition, Convention Hall, Detroit Dec. 5-13	
Automotive Service Industries Joint Show, Chicago	Dec. 9-13
Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago	Apr. 24-28, 1937

CONVENTIONS AND MEETINGS

American Chemical Society, Semi-annual Meeting, Pittsburgh, Pa., Sept. 7-12	
World Power (Fuel) Conference, Washington, D. C.	Sept. 7-12
American Gear Manufacturers Association, 19th Semi-annual Convention, aboard SS. Seandebbe, sailing Chicago to Cleveland	Sept. 8-10
United Rubber Workers Union Convention, Akron	Sept. 14

* Tentative dates.

Annual Meeting and Convention of the National Association of Sales Finance Companies, Hot Springs, Va.	Sept. 14-16
American Society of Mechanical Engineers, Niagara Falls Meeting, Schenectady and Niagara Falls, Sept. 16-19	
American Transit Association Convention, White Sulphur Springs, W. Va.	Sept. 21-24
North American Gas Tax Conference, Richmond, Va.	Oct. 6-9
S. A. E. Fuels and Lubricants Regional Meeting, Dallas, Tex.	Oct. 8-9
5th Nat'l Road Oil and Asphalt Congress, Tulsa, Okla.	Oct. 8-9
Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich.	Oct. 15-16
First Aircraft Production Meeting of the S. A. E., Los Angeles	Oct. 15-17
American Trucking Associations, Inc., Third Annual Convention, Chicago, Oct. 19-21	
American Society for Metals, 18th Nat'l Congress, Cleveland, O.	Oct. 19-23
16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23	
American Gas Association, Annual Meeting, Atlantic City	Oct. 26-31
American Foundrymen's Ass'n Conference on Foundry Practice, Univ. of Iowa, Iowa City, Ia.	Oct. 30-31
American Petroleum Institute, Annual Meeting, Chicago	Nov. 9-12
Society of Automotive Engineers Annual Dinner, New York	Nov. 12
International Day, National Automobile Show, New York	Nov. 16
National Foreign Trade Convention, Chicago	Nov. 18-20
16th Annual Meeting, Highway Research Board of the National Research Council, Washington, D. C. ..	Nov. 18-20
International Acetylene Assn., 37th Annual Convention, St. Louis, Nov. 18-20	
Natl. Industrial Traffic League, Annual Meeting, New York City	Nov. 19-20
Tin Can Tourists' Get-Together Meeting, Lake City, Fla.	Nov. 22-28
Tin Can Tourists' Homecoming, Arcadia, Fla.	Dec. 28, 1936-Jan. 3, 1937
S. A. E. Annual Meeting, Detroit, Mich., Jan. 11-15, 1937	
Tin Can Tourists' Winter Convention, Clearwater, Fla. ..	Jan. 29-Feb. 8, 1937
Tin Can Tourists' Annual Convention, Sarasota, Fla.	Feb. 8-14, 1937

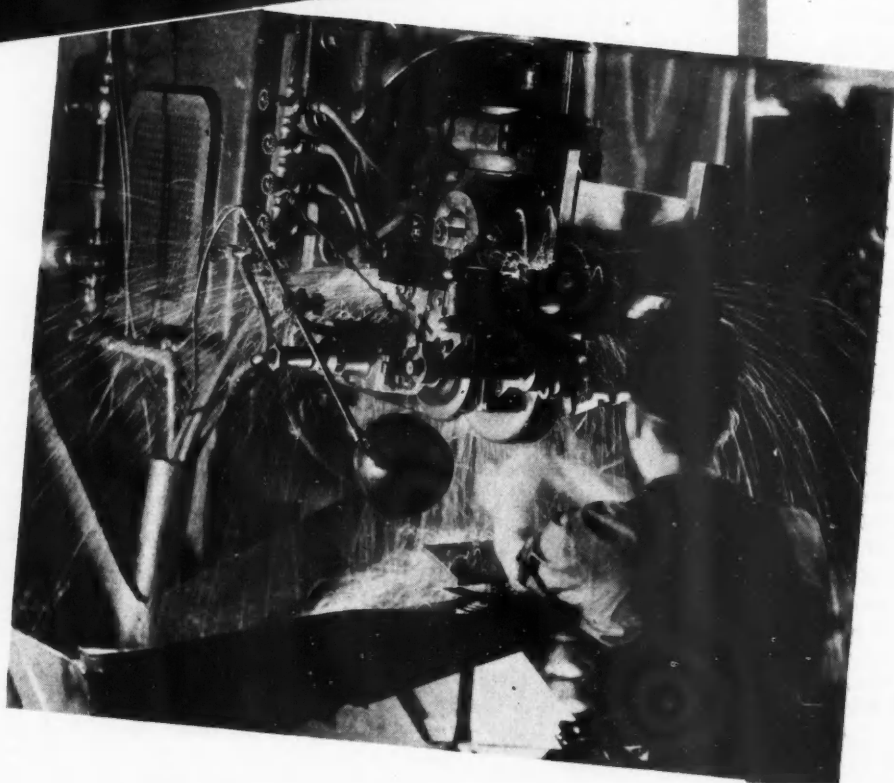
CONTESTS

100-Mile National Championship, New York State Fair, Syracuse	Sept. 12
First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I.	Oct. 12
500-Mile International Sweepstakes, Los Angeles Raceway	Nov. 29

**THIS MONTH'S
PRODUCTION FEATURE**



**(Above) Lectromelt
electric furnace in the
Bendix foundry**



**(Right) Welding
brake shoe stampings**

Bendix South Bend Plant Tooled For Versatility

Facilities For Engineering Design And Research, The Famous Brake School, And A Complete Manufacturing Set-Up Housed Within 1,250,000 Sq. Ft. Of Floor Space

By Joseph Geschelin

"MAKING motor cars and aircraft—start better—run better—handle better—stop better" is the slogan of the Bendix Aviation Corp. that best epitomizes the philosophy of this giant supplier to the automotive industry.

Today, the name Bendix encompasses the activity of 21 subsidiary companies engaged in the development, manufacture, and distribution of parts and accessories for the automotive, aviation, marine, and industrial producers. Although many of the Bendix companies are familiar to readers of *AUTOMOTIVE INDUSTRIES*, we have listed them completely on page 309, for reference purposes.

Romantic chapters of automotive history are interwoven with the growth of this organization—the "mechanical hand that cranks the car," four-wheel brakes and their first American debut, servo-brakes, Bendix B-K Vacuum Power Brakes, the Bendix Trophy, automatic choke, Startix, more recently the "electric hand," and just today the compact little battery-powered outboard motor, the marine air-cooled gasoline outboard, and the Bendix-Weiss constant velocity joint. Its breadth of activity is so manifold that Bendix richly merits a niche in the *AUTOMOTIVE INDUSTRIES* series of first-of-the-month industry features.

Since it would be impossible to cover the activity of all Bendix units in the brief space of a single article, the locale for the present discussion is based on the South Bend plant

which includes its major elements of automotive production. Here are found complete facilities for engineering design and research, the famous brake school, and complete manufacturing facilities including a foundry and forge shop. All these are housed within a total floor space of 1,250,000 square feet.

Generally speaking, the floor space in the manufacturing divisions has been prorated among the following divisions: *brake division*, which easily takes the lion's share, *automotive car-*

buretors, and the *aircraft division*, which builds carburetors, brakes, wheels, shock struts, and pilots' seats. A spirit of modernity prevails in every production department with special accent on quality control, productivity, and operator's safety. The latter is particularly evident on all press operations, the workers being safeguarded against any possibility of hazard. An interesting feature of the press department is the investment of many thousands of dollars in Danly press die sets of every character and in a large variety of sizes.

A complete chemical and metallurgical department housed in the core of the plant serves as a watchdog on quality control. The department has under its wing the control of all incoming raw materials, the heat treating department, plating baths, and the gamut of other things that require special technical treatment. Recently the technicians were treated to a new laboratory including an X-ray machine rated at 145,000 volts with a



Bendix has what is said to be the longest under-roof depressed loading dock

(Right) Pouring molds
in the iron foundry

(Below) A No. 665 To-
ledo coining press forms
malleable iron fittings



ment is a small chromium plating section devoted to the hard-plating of production tools such as drills, reamers, gages, etc. In some cases the hard plating is applied purely as a salvage operation after the tools have worn down; in many cases, particularly in the drilling of aluminum parts, the tools are plated while new. This has been found to increase tool life materially and improve the quality of the work.

Another important improvement is the development of a zinc dichromate plating bath for certain parts which require a corrosion-free surface. This treatment will stand 200 hours in the salt spray before failure occurs.

The visitor to the South Bend plant will find a bewildering array of departments which nevertheless assume a most natural disposition when one has been taken through from start to finish. As the result of our own trip through the plant we can give you the following word picture of its layout:

First is the brake division, easily dominating all other activities so far as floor space requirements are concerned. Here are built not only mechanical and hydraulic brakes for passenger cars and trucks, but also some of the newer items such as the electric hand, gasoline and electric outboard motors, and a line of ventilating fans.

The brake division comprises the following major departments: brake final assembly, brake parts machine shop, shoe manufacturing dept., lining processing dept., stamping division, cable production, plating dept., heat treat, automatic screw machine, forge shop, B-K power brake dept.

penetration of over an inch in steel.

The X-ray is rapidly finding an indispensable place in industrial research and at Bendix its biggest role has been the study of aircraft carburetor castings to assure the production of housings free of porosity. Formerly it was not uncommon to spend days of work in machining a carburetor body only to find blow holes somewhere at the surface, making a total loss of all the investment of time and labor. Today it is possible to detect porosity in the raw casting and reject it before any machine work is done.

However, the X-ray goes beyond this. Because of its facility in seeking out internal flaws, it is possible to experiment with foundry procedure—the location of gates and risers, etc.—to the end that eventually a technique is developed which eliminates flaws entirely. From that point on it is necessary only to make sampling checks of production castings to assure continued good quality. That has been accomplished at Bendix within a relatively short time.

One of the interesting things developed by the metallurgical depart-



(Left) Cyanide hardening furnaces in the heat treating department

(Right) An Erie board drop hammer turns out small forgings. Hardtem dies are used to resist heat, shock and abrasion



Bendix Factory Routing Throttle Valve Body

Operation	Machine Name
Grind attachment and flange faces	Blanchard Grinder
Rough and finish broach both bores	Oil Gear Broach
Straddle mill stem bosses	Cinn. Mill 2 at a time
Drill throttle stem hole (2 at a time) cam feed Allen and ream stem hole on liner reamer	Allen Drill and Pr. Head
Counterbore stem hole 1 end and chamfer other end	L&G Dr. Pr. and Spd. Hd.
Counterbore both ends of stem hole	L&G Dr. Pr. and Spd. Hd.
Drill 3 holes in flange, 2 holes in attachment face and spot face for lever stop on flange (3 pcs. complete per cycle)	Natco Multi. Spdl. Dr. Pr. with 5 station Index Fixtures
Drill and flat bottom 2 idle bleed holes and burr (2 holes at a time)	6 Spdl. L&G Dr. Pr. Equipped with (2) 2 Spdl. Heads
Drill and spotface and flat bottom idle adj. holes (2 holes at a time)	6 Spdl. L&G Dr. Pr.
Drill back idle holes (2)	6 Spdl. L&G Dr. Pr.
Tap 3 attachment holes and drill 2 idle channel holes	2 Spdl. Kingsbury
Burr where necessary	Bench
Blow out castings	Bench and Conveyor
Place bodies on parkerize racks	Parkerize Equip.
Park. bodies and remove to racks and blow out	Paint Conveyor
Place on conveyor and remove lacquered body	Paint Spray Equip.
Spray one coat of lacquer	4 Spdl. L&G Dr. with 2 Spdl. Tapping Hd. and blowout fixture
Flat bottom and tap 2 idle adj. holes and blow out chips	4 Spdl. L&G Dr. Pr.
Assy. 2 drill bushing and drill 2 idle holes and remove bushings	4 Spdl. L&G Dr. Pr.
Assy. 2 bushings and drill idle holes (1 hole at a time) and remove bush.	4 Spdl. L&G Dr. Pr.
Wire brush throttle bores and blow out 2 bleed holes	Power Speed Head
Inspect	Bench

The automotive carburetor division—Stromberg—comprises the foundry, handling iron, aluminum, and die castings; screw machine dept.; parts machining; body machining; final assembly; and testing.

The aircraft division is quite different from the rest since most of the work is of such nature as to require skilled mechanics who can give the work their individual attention and painstaking care. This department produces the aircraft carburetor, airplane wheels and brakes, a line of patented shock struts, and pilots' seats.

Some comparison of the difference in the requirements of aircraft and automobile practice may be gained from the following figures on the relative weights of airplane and pas-

(Right) No. 59½
Toledo presses are
used on the backing
plate line

(Below) Vacuum cyl-
inder shells are deep
drawn on this No. 307
Bliss press



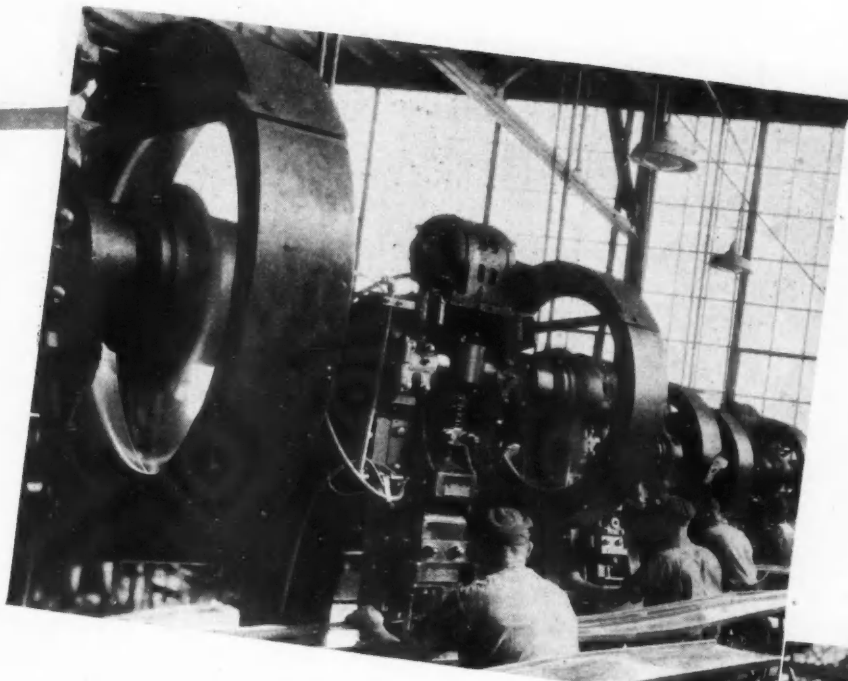
senger car brake assemblies:
Mechanical airplane brake
assembly 7 lb. 8 oz.
(per wheel)

Bendix Factory Routing Main Body

Operation	Machine Name
Ream and face bottom of large and small venturi	L&G Dr. Pr.
Wire brush bodies	Double End Gr. and Wire Brush
Trim float bowl upper and lower attach. faces	Punch Press
Break flash from side of small venturi	Bench and Fixt.
File die seams and bottom of pump boss	Bench and Fixt.
File-gasket surfaces and where flange die did not trim and pack castings	Bench and File
Trim slugs from inside small venturi	No. 1 Federal Press
Drill and Ct'bore cross pump channel hole and chamfer 2 high speed bleed holes	L&G Dr. Pr. 6 Spdl.
Drill and Ct'bore 1 idle air channel holes	L&G Dr. Pr. 6 Spdl.
Drill and Ct'bore idle air channel hole	L&G Dr. Pr. 6 Spdl.
Open 2 idle tube holes and taper ream small venturi	L&G Dr. Pr. 6 Spdl.
Comb. main jets and comb. ct'bore and face check valve	L&G Dr. Pr. 6 Spdl.
Finish seat main jet holes	L&G Dr. Pr. 6 Spdl.
Comb. idle 2 idle air bleed holes	L&G Dr. Pr. 6 Spdl.
Face and tap by-pass valve seat and ream pump piston	L&G Dr. Pr. 6 Spdl.
Open 3 attach. holes and open 3 main jet bleed holes	L&G Dr. Pr. 6 Spdl.
Tap 5 attach. holes and tap 2 idle tube holes	New Natco Comb. Dr.
Drill small venturi and drill into main disch. channel for pump tube	L&G Dr. Pr.
Drill small venturi and drill into main discharge channel for sec. pump tube	L&G Dr. Pr.

Bendix Factory Routing Front Brake Housing Plate

Operation	Machine Name
Blank and draw	No. 309 Bliss Pr.
Reduce	No. 309 Bliss Pr.
Second form	No. 59 Toledo Pr.
Trim and pierce for strain relief.....	No. 57 Toledo Pr.
Flange and stamp.....	No. 59 Toledo Pr.
Finish pierce center and pierce 10 holes	No. 57 Toledo Pr.
Pierce 1 hole inside.....	P-4 Ferracuta Pr.
Ream and chamfer center hole.....	Sibley Dr. Pr.



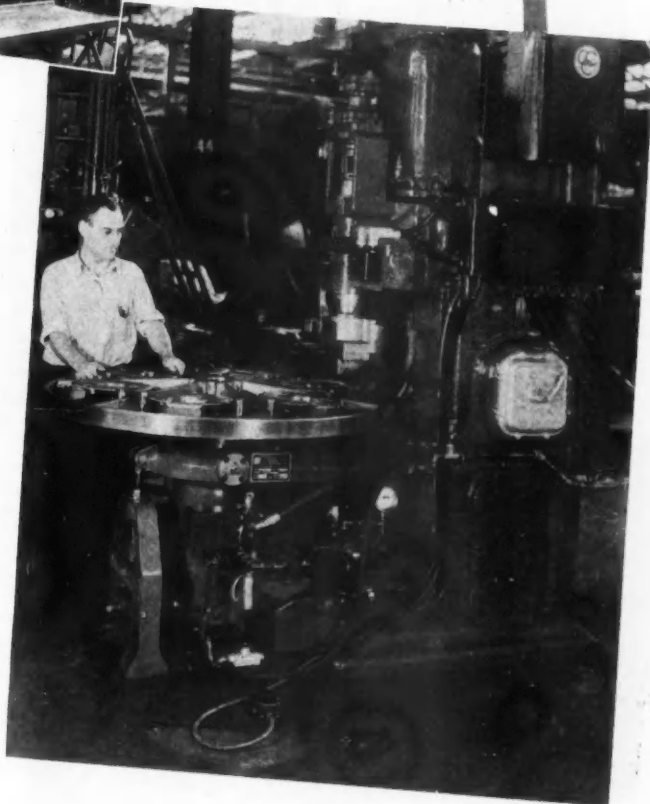
(Left) Presses for stamping small parts are equipped with Danly progressive dies

Mechanical auto brake (12 in.) 11 lb. 3 oz.
 Hydraulic airplane brake 7 lb. 9 oz.
 Hydraulic auto brake (12 in.) 15 lb. 14 oz.
 It is quite obvious that a varied

Bendix Factory Routing Main Body

(Continued)

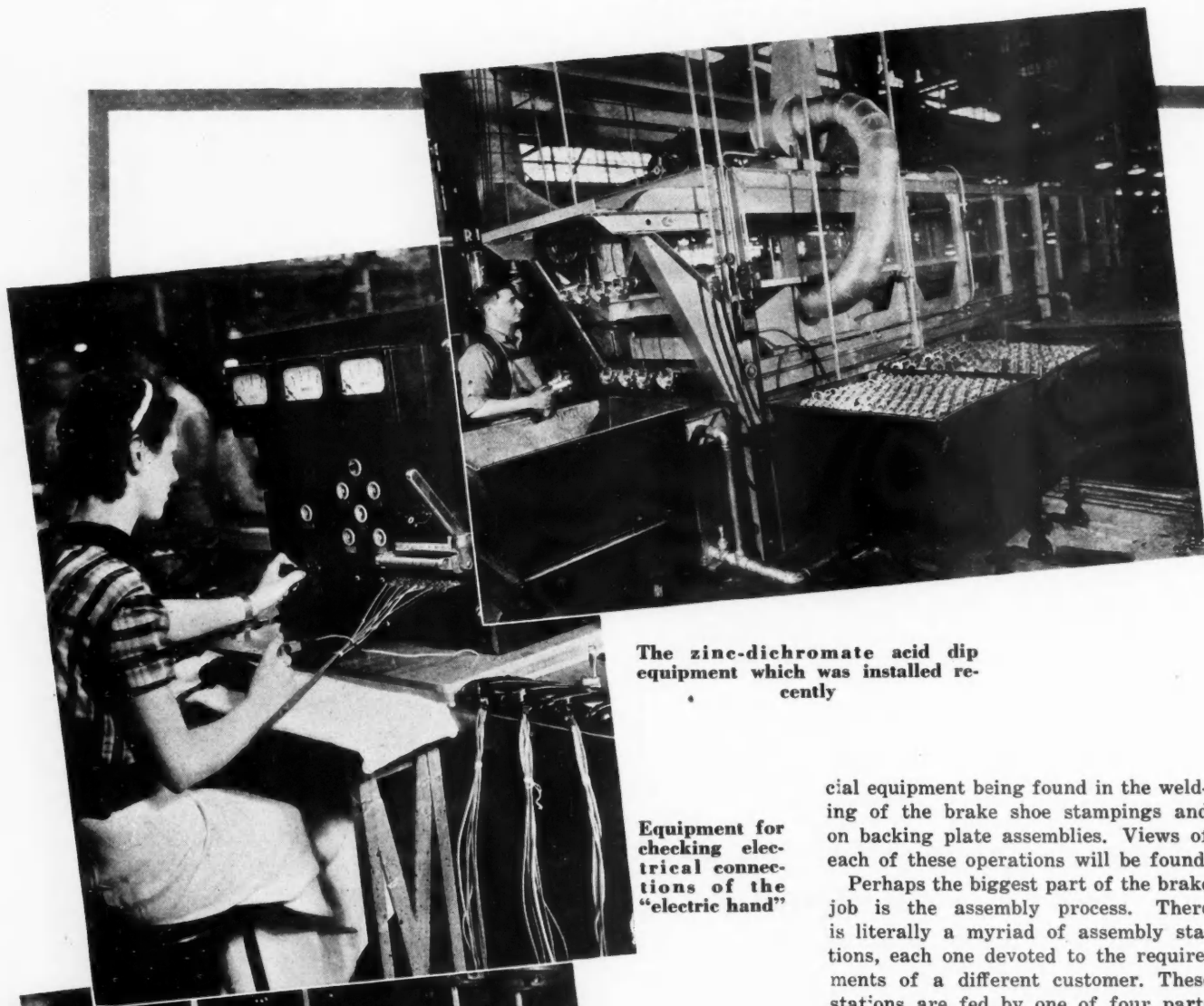
Operation	Machine Name
Chamfer and drill devaporize holes	L&G Dr. Pr.
Tap 2 main disch. jets and check valve holes	L&G Dr. Pr.
Face gas conn. tap float needle seat roll float fulc. screw hole	L&G Dr. Pr.
Brush out gas inlet, hand ream 2 venturi and blowout bodies	Bench and Air Hose
Open 2 idle channels, clean slots in M.D. jet holes, open 2 vertical idle channels and clean bottom of pump hole	Bench and Light Bench and Light
Scrape around large venturi	Bench
Remove burr from pump slot, burr pump tube holes and burr top of pump boss	Bench
Burr check valve hole and open 2 pump tube holes	Bench
Open 2 high speed bleed holes, 2 vertical pump holes, and 1 pump cross channel	Bench
Open 4 devaporizer holes and pump holes in small venturi	Bench
Burr inside float fulcrum screw boss and burr gas connection hole	Bench
File corners of small venturi	Bench and File
Scrape burrs from idle air slots and remove any burrs from holes leading into MDJ threads	Bench
Open 2 M.D. jet feeder holes and drift large venturi to straighten	Bench
Remove from wash conveyor and pack in boxes between paper	Bench
Drill 2 high speed bleed holes and place in tray	L&G Dr. Pr.
Machine top of small venturi	L&G Dr. Pr.
Load dichromate conveyor	Conveyor and Tanks
Unload conveyor	Conveyor and Tanks
Blowout, pack and deliver to insp.	Bench and Air Hose



(Above) Resistance welder made by National Electric Welding Machines Co. welds dust rings on backing plates

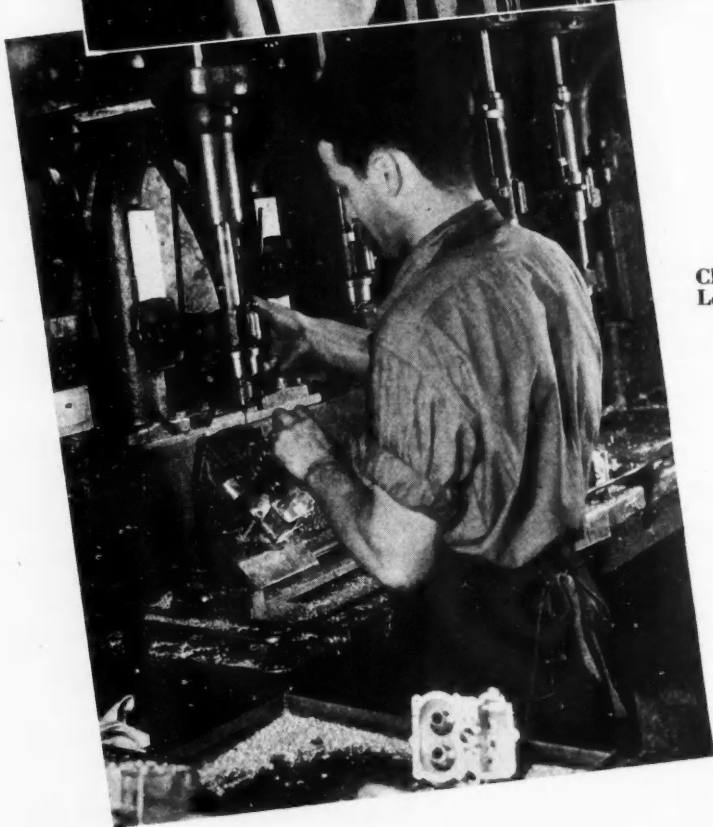
operation such as is found at South Bend has altogether too much detail to permit of even a modest word summary within the confines of a single article. Consequently, we shall rely to a great extent upon the pictorial section which has been so arranged as to give a fair cross-section of the activity in many corners of the plant.

Coming first to the brake division, we show a large group of interesting camera studies of press operations, machining, and assembly. Considerable resistance welding is done in this department, the best examples of spe-



The zinc-dichromate acid dip equipment which was installed recently

Equipment for checking electrical connections of the "electric hand"



Close-up of a Leland-Gifford spindle

cial equipment being found in the welding of the brake shoe stampings and on backing plate assemblies. Views of each of these operations will be found.

Perhaps the biggest part of the brake job is the assembly process. There is literally a myriad of assembly stations, each one devoted to the requirements of a different customer. These stations are fed by one of four parts feeder conveyor lines, one of which is at least 2000 feet in length. A familiar feature of the feeder conveyor chains is the use of colored hooks which identify the different brake assemblies by association with a characteristic color. The spacing of component parts on the chain is so arranged as to produce the most efficient distribution of these parts to the assembly benches. Just as an interesting sidelight, we might mention that the spacing has been so well coordinated, over a period of time, with the rhythm of workbench operators that they have acquired the knack of reaching for the right parts without even looking up from their work.

Each brake assembly workbench is completely fitted with standard tools and gages so that the wheel assemblies are finished right down to standard factory adjustment as they leave any particular station.

Giant presses by Bliss, Toledo, and Hamilton, tower in the brake department, being used primarily for producing the brake backing plates.

In one corner of the brake depart-



"Electric hand" assemblies are made in this department

ment is a small department completely caged so as to keep out unauthorized persons. This is where Bendix is building the new battery-powered outboard motor. Component parts delivered from the machine shop are assembled into the handsome, compact units on small work benches. After assembly and inspection, the motors are submerged in a special water tank where each one undergoes a stiff test period under actual service conditions to make sure that it will stand the gaff when delivered to a customer.

Another special department housed in the brake division is the home of the now famous "electric-hand." The pictorial section shows one of the assembly stations, also a view of one of a group of electric testing machines used for a complete exploration of the electric elements of the unit. We rather suspect that it is a question of only a short time before this modest department will grow into a sizable plant if it is to handle the volume of business for remote controls which is anticipated for 1937 productions.

Before leaving the brake department, we draw your attention to two factory routings which cover some of the productive activity here—one is a typical backing plate press shop routing, the other covers a typical backing plate assembly indicating the welding operations.

The automotive carburetor division shows evidence of intensive activity, not only because of the large volume

Zinc - plating conveyor and tank for plating brake shoes

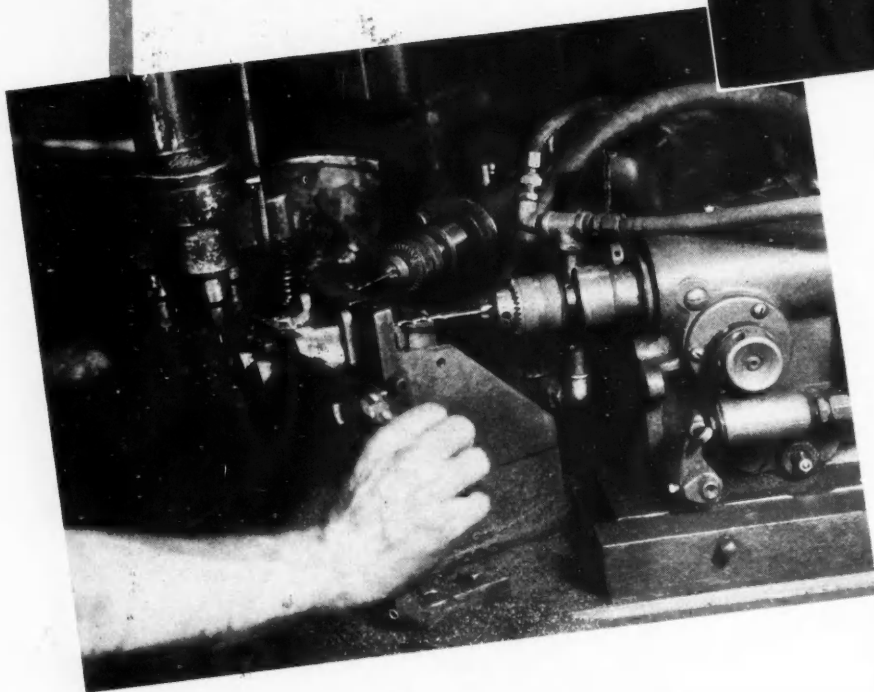


Equipment for drilling rivet holes in brake lining



(Right) Natco multiple drill taps five attachment holes and two idle tube holes

(Below) Kingsbury two-spindle machine drills angular idler channel holes



of product that it enjoys but also because of the number of small parts and the multiplicity of operations required on each part. Take the carburetor body for example. So many fine holes must be drilled, reamed, and tapped, and they are located in so many different positions in the casting that it is practically impossible to use specialized multiple-spindle machines such as are commonly used in the automobile plants. As the pictorial section indicates, most of the carburetor drilling equipment consists of single spindle

drill presses, although wherever possible multiple-spindle equipment has been employed.

However, if they use single-spindle equipment don't look for a scattered few small drill presses. Indeed the visitor's eye is held by a veritable forest of spindles—many rows of them, manned by scores of operators who deftly pass the work from station to station, after completing their own job.

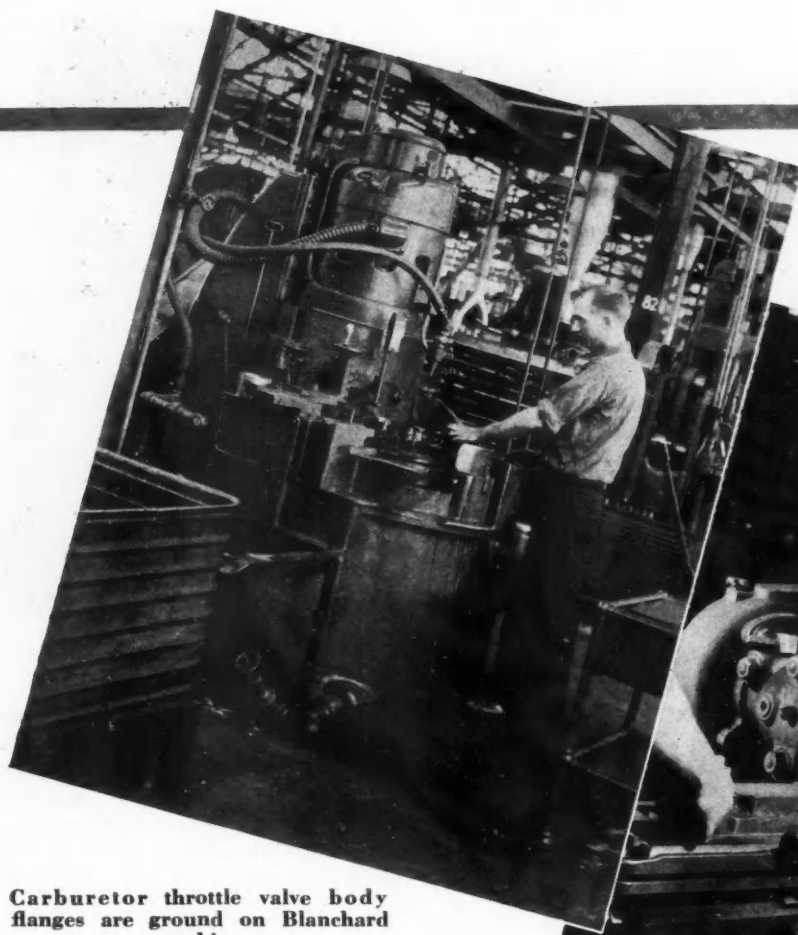
You can get a better picture of the multiplicity of operations by consult-

ing the sequence of operations on the throttle body and main housing.

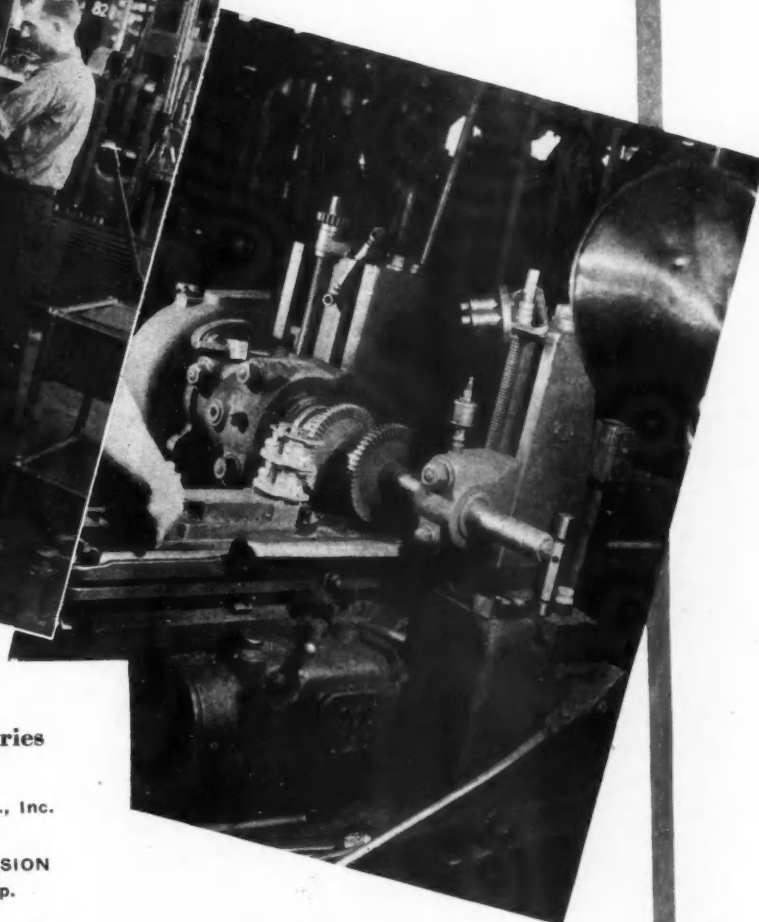
As the work flows up the department, through the machining operations, it eventually reaches the sub-assembly and final assembly stations which are literally packed with assembly operators. Several views in the pictorial section show how intensively the work benches are manned (by girls) so as to facilitate the handling of the multitude of fine details that constitute a carburetor.

A better picture of what constitutes a carburetor assembly line may be gained from the routing of a typical production unit, given here.

May we say to those who are not familiar with carburetor production that the machining and assembly, with all their complexity and fineness of detail, are but a small part of the manufacturers' responsibility. Regardless of the precision with which the preliminary work is done, the functioning of the carburetor is dependent upon a combination of elements and these must be carefully controlled and checked. For this reason, Stromberg has established a number of test fixtures along the assembly lines to check the flow through connective passages and nozzles exposed during the several stages of sub-assembly. These tests supplement the customary final flowmeter tests, leak tests, and other controls exercised after the carburetor



Carburetor throttle valve body flanges are ground on Blanchard machine



Throttle valve body stem bosses are straddle-milled on Cincinnati machine

Bendix Aviation Corporation Subsidiaries

AUTOMOTIVE DIVISION

Bendix Products Corp.
South Bend, Ind.
Bendix Brake Co.
South Bend, Ind.
Bendix - Westinghouse Automotive Air Brake Co.
Pittsburgh, Pa.
Hydraulic Brake Co.
Detroit, Mich.
Eclipse Machine Co.
Elmira, N. Y.
Bendix-Stromberg Carburetor Co.
South Bend, Ind.
Zenith Carburetor Co.
Detroit, Mich.
Bragg-Kliesrath Corp.
South Bend, Ind.
Marshall Asbestos Corp.
Troy, N. Y.
Bendix-Eclipse of Canada, Ltd.
Walkerville, Ontario
Bendix-Cowdrey Brake Tester, Inc.
South Bend, Ind.
Lubrication Corp.
South Bend, Ind.

INDUSTRIAL DIVISION

Eclipse Textile Devices, Inc.
Elmira Heights, N. Y.
Bendix Products Corp.
South Bend, Ind.
Zenith Carburetor Co.
South Bend, Ind.
Bendix-Stromberg Carburetor Co.

South Bend, Ind.
Scintilla Magneto Co., Inc.
Sidney, New York

AVIATION DIVISION

Eclipse Aviation Corp.
East Orange, N. J.
Pioneer Instrument Co., Inc.
Brooklyn, N. Y.
Scintilla Magneto Co., Inc.
Sidney, N. Y.
Bendix-Stromberg Carburetor Co.
South Bend, Ind.
Bendix Products Corp.
South Bend, Ind.
The Dayton Products Co.
Dayton, Ohio
Delco Aviation Corp.
Sidney, N. Y.
Julian P. Friez & Sons, Inc.
Baltimore, Md.

MARINE DIVISION

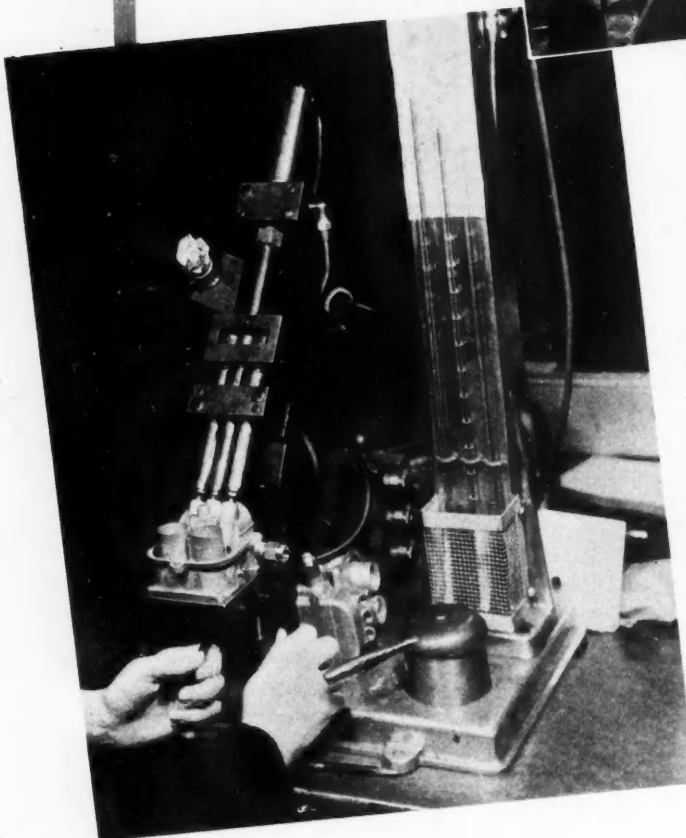
Charles Cory Corp.
New York, N. Y.
Bendix Products Corp.
South Bend, Ind.
Bendix Marine Products Co.
South Bend, Ind.
Bendix-Stromberg Carburetor Co.
South Bend, Ind.
Zenith Carburetor Co.
Detroit, Mich.
Julian P. Friez & Sons, Inc.
Baltimore, Md.
Pioneer Instrument Co., Inc.
Brooklyn, N. Y.

Bendix Factory Routing Backing Plate Assembly

Operation	Machine Name
Assemble and weld auxiliary dirt guard to dirt guard	Press Welder 500 KVA
Assemble and weld anchor reinforcement to backing plate	Press Welder and Fixt.
Assemble and weld dirt guard assembly to backing plate	1500 KVA Hyd. Press
Assemble and weld conduit bracket reinforcement to backing plate	Press Welder & Fixt.
Punch 2 holes	P-3 Ferracut Press
Punch chamfer 2 holes	No. 1 Federal Press
Tap 2 holes	Canedy-Otto Dr. and Tap
Assemble and weld spring anchor to backing plate	Press Welder & Fixt.
Restrike dirt guard	Toledo Press
Inspect	Bench
Zinc plate	Plating Conveyor
Inspect	Bench

(Right) Snagging line
in carburetor foundry

(Below) Restriction test
on passages in carburetor
main body



noted earlier, a moderate-sized foundry capable of handling castings in iron, aluminum alloy, and a little brass. It also houses a small die casting plant which produces much of Stromberg's requirements for zinc and aluminum alloy castings, although

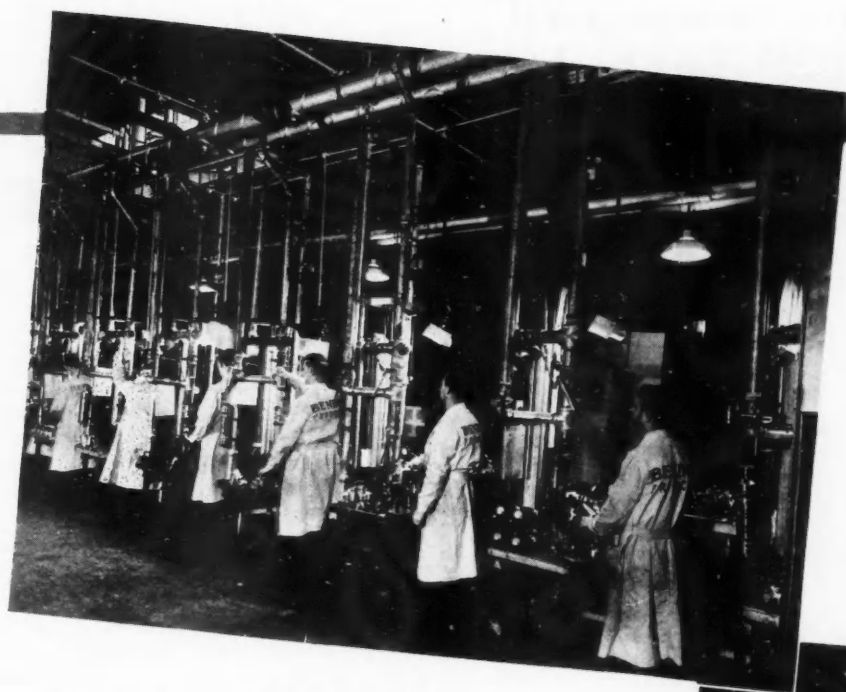
Bendix Factory Routing Carburetor Assembly

Operation	Machine Name
Assemble 2 bushings in stem hole and assist line reamer	Arbor Press
Line ream stem hole	Line reamer
Assemble stem to body and locate 1 valve	Bench
Assemble 1 screw to valve plate, locate sec. valve	Bench and Yankee
Assemble 2 screws	Bench and Yankee
Assy. 1 screw and free valve action	Bench and Yankee
Stake valve screws	Air Staking Machine
Drill 2 idle bleed holes	Dumore Dr. Pr.
Check idle holes	Bench and Test Fixture
Assemble 2 back idle plugs and 2 idle bleed plugs	Bench and Test Fixture
Assemble lever, spring and stop and drive pin	Bench and Test Fixture
Assemble stem and washer and locate valves	Bench and Fixture
Assemble 2 valve screws and secure	Bench and Fixture
Press cap into stem	Arbor Press
Stake 2 valve screws and secure	Air Oper.; Staking Tool
Centralize and free valve	Bench
Assem. 2 tubes and bushings to main body and assy. 2 lead balls	Bench and Fixture
Assem. 2 main discharge jets and 2 meter jets	Bench and Fixture and Air Dr.
Assemble 1 lead ball to channel, assy. float and fulc. loose-drop 2 idle tubes	Bench and Fixture
Secure 2 idle tubes and by-pass jet and check	Bench and Fixture and Yankee
Assem. needle seat and secure fulc.	Bench and Fixture
Set float and stamp meter jet	Bench and Gauge

has been completely assembled. We are told that this is considered to be a unique development in carburetor manufacture and to us it brings further evidence of the service that Stromberg is set up to give its customers.

Referring again to the assembly routing, three preliminary test operations will be noted—items 9, 10, and 11 reading down. Still further down the line is another sub-assembly test for idling.

The carburetor division includes, as



(Left) Final flow test of Stromberg carburetors on this line

(Below) Forest of spindles in the carburetor machining line

many die castings such as the electric hand body and some carburetor castings are purchased from outside suppliers. Bendix is one of the largest users of zinc alloys in the country.

The aircraft division naturally has a great many things of vital interest.

Bendix Factory Routing Carburetor Assembly

Operation	Machine Name
Inspect float adjustment and meter system. Stake 2 idle needle seats and assem. idle needle	Bench
Assemble 2 main jet plugs and gaskets to body and secure	Bench and Fixture
Assem. throttle body to main body with gasket and 2 screws and washers	Bench and Air Dr.
Assem. throttle adj. screw and spring and 1 mount screw and washer	Bench and Air Dr.
Idle test	Bench and Test Fixture
Assy. gasket to air horn and assy. pump assy. spring and fulc. and cotter	Bench and Elec. Drill
Blow out main body, assem. air horn to main body and start 2 screws	Bench and Fixture
Assy. pump and stake and blow out and assy. float needles to seat	Bench
Assem. 2 screws and secure 4 attach. screws	Bench and Fixt. and Air Dr.
Assemble spring to air horn lever fulc. screw and start in body and assy. idle adj. screw	Bench
Finish secure air horn lever fulc. and drive 2 lead balls in air bleed channel and secure 1 screw	Bench and Fixt. and Elec. Dr.
Assemble link to ball end levers and adj. throttle stop	Bench and Test Stand
Econ. test and hook up spring	Bench and Fixt. and Dr.
Assy. check valve and gasket and check valve plug and secure	Test Equipment
Leak Test	Bench
Bench inspect	



However, much of the work involves skilled hand labor supplemented by tool room equipment and consequently could not be described adequately without going into complete details of each part. For this reason we shall content ourselves with the statement that everything in the aircraft division is produced with painstaking care, with infinite attention to small details, and to standards which must satisfy War

(Turn to page 326, please)

Hypoid-gear final drive incorporated in Dictator Sixes and President Eights

Studebaker Announces Line

STUDEBAKER is one of the first among automobile manufacturers to announce its 1937 line. The firm continues the simplified line of Dictator Sixes and President Eights, now incorporating hypoid-gear final drive. The new models will have their first public showing on September 15.

While there is nothing radical in body construction or chassis features, the line does reveal many improvements both in styling and mechanism that contribute to eye-appeal, safety, and performance. As in 1936, f.o.b. prices start at \$665.00 for the Dictator and \$965.00 for the President.

Eye-appeal is enhanced by a special treatment of the radiator and a new one-piece, hinged hood which raises and lowers to permit access to the engine compartment. Horizontal grids on the radiator front are extended rearwardly along the top section of the hood to carry out the louver treatment. Deep, one-piece fenders are faired to reduce wind resistance and to blend with body and radiator contours. Headlamps have been raised to assure a longer beam for night driving. Running boards are of colored rubber to match the individual body color. Chromium-plated disk wheels are now standard equipment throughout the entire line.

All body models have an improved ventilating system comprising a fixed windshield, split front windows with

By Joseph Geschelin

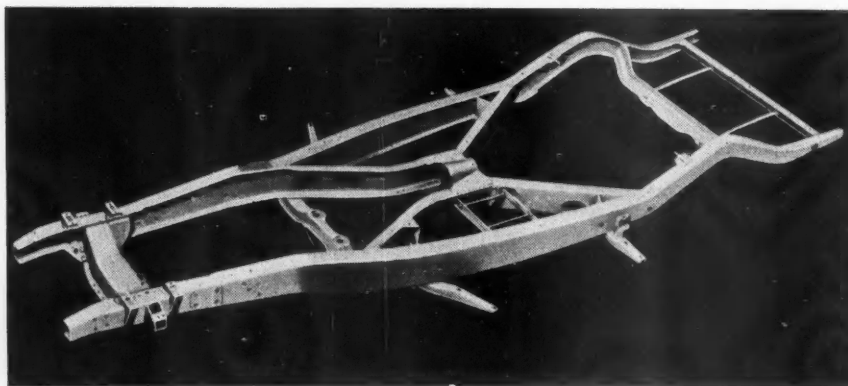
the forward ventilating pane pivoted in the garnish molding, and rear quarter windows of the pivoted type opening out to the rear. The cowl ventilator has a firm lock.

The engines remain the same as last year except for detail changes. That of the Dictator is a 6-cylinder, L-head type of 3¼-in. bore and 4½-in. stroke (217.8 cu. in. displacement) which is rated 90 hp. at 3400 r.p.m.; it has a cast-iron head and a standard compression ratio of 6 to 1. Pistons are of Lynite, cam-ground and with T-slot. A Stromberg down-draft carburetor and automatic choke are standard equipment. Spark plugs are 18 mm. Engine bearings are of babbitt, which is spun in the case of the connecting rods and steel-backed in the main bearings. Camshaft gears are of the non-metallic type on all models.

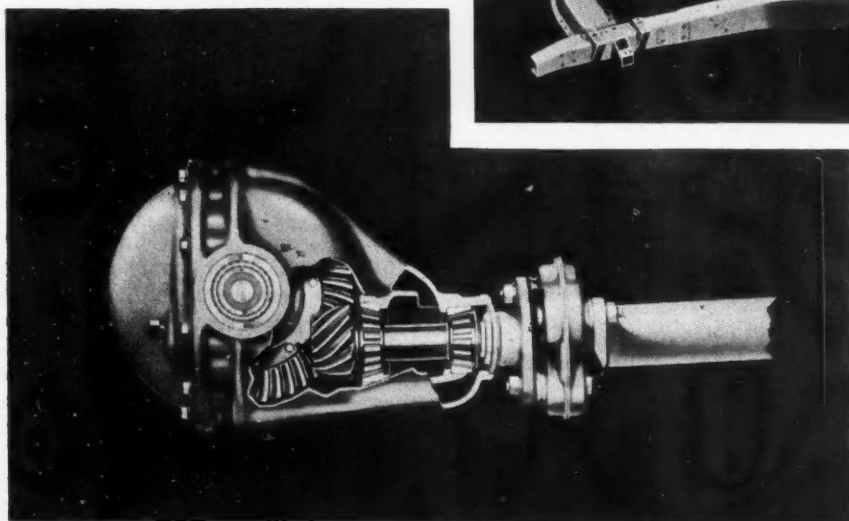
The President engine is an 8-cylinder, L-head type of 3 1/16-in. bore and 4¼-in. stroke (250.4 cu. in.); it is rated 115 hp. at 3600 r.p.m. This engine has an aluminum head and a standard compression ratio of 6.5 to 1. Lynite pistons and babbitt bearings are standard.

All Studebaker engines are fitted with the "Fram" oil and motor cleaner. Owners will be advised by the factory that crankcase oil need no longer be changed periodically, except for summer and winter seasonal changes. When the oil is too dirty, by the dip-stick test, the owner is instructed to replace the "Fram" cartridge.

Among the noteworthy chassis improvements for 1937 are the "positive controlled automatic overdrive" transmission on the President; hypoid rear axles on all models (lowering the floor level 3 1/16 in.); and a new double-drop frame embodying the box-section side-rail X-member construction introduced last year. The "planar" indi-



(Above) The new double drop frame



(Left) Cut-away view of hypoid-gear rear-axle drive

e For 1937

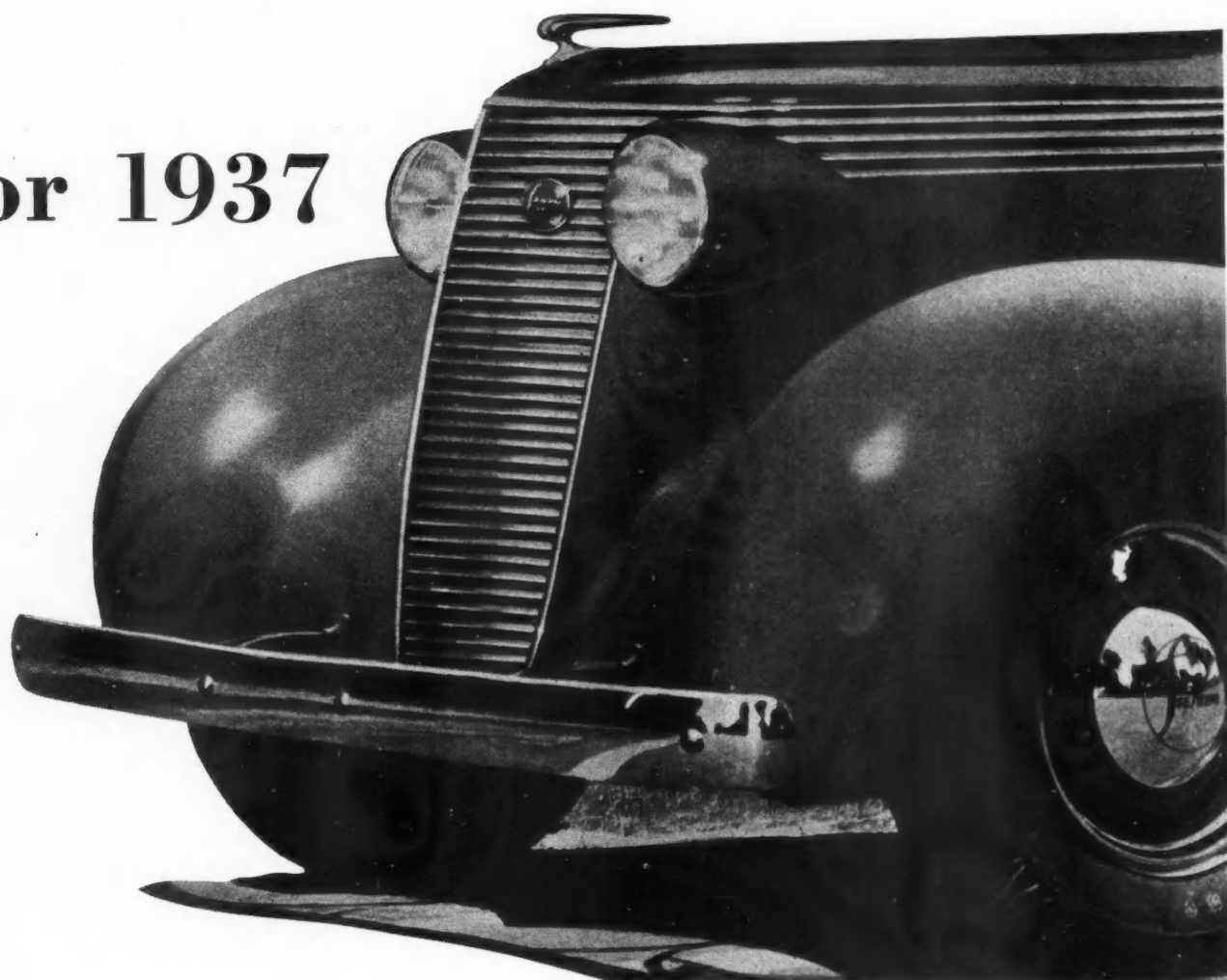


TABLE I—1937 Studebaker Body Models

The President	The Dictator
Coupe (3-pass.)	Coupe (3-pass.)
Coupe (5-pass.)	Coupe (5-pass.)
St. Regis Custom Sedan (2-door)	St. Regis Custom Sedan (2-door)
St. Regis Cruising Sedan (2-door)	St. Regis Cruising Sedan (2-door)
Custom Sedan (4-door)	Custom Sedan (4-door)
Cruising Sedan (4-door)	Cruising Sedan (4-door)

TABLE II—Significant Specifications

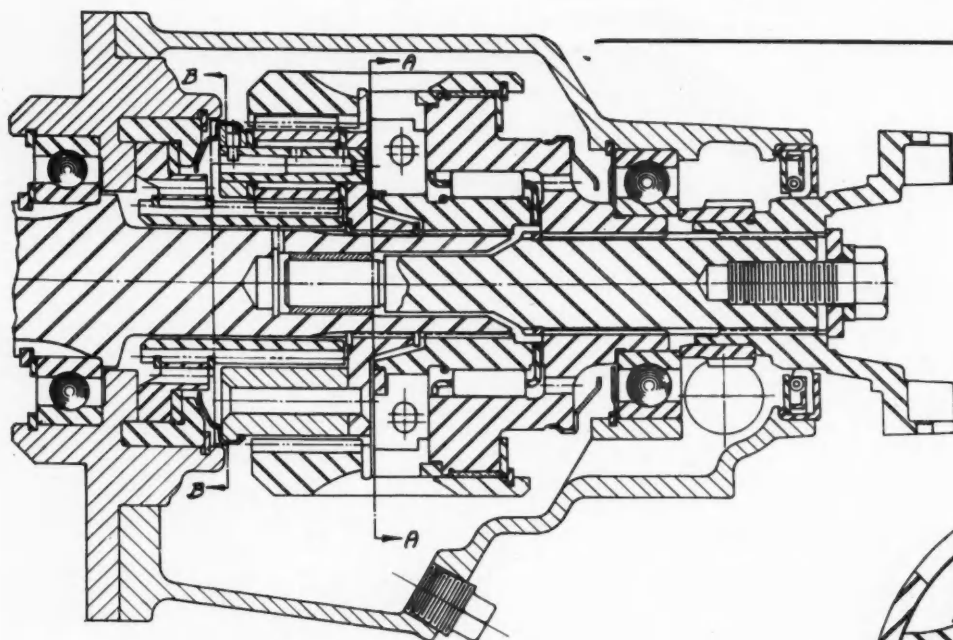
	The President	The Dictator
Wheelbase	125 in.	116 in.
Horsepower (brake) ..	115 @ 3600 r.p.m.	90 @ 3400 r.p.m.
Horsepower (taxable) ..	30	25.35
Piston Displacement ..	250 cu. in.	217.8 cu. in.
Bore and Stroke	3 1/16 in. by 4 1/4 in.	3 1/4 in. by 4 3/8 in.
Compression Ratio ...	6.5-1 (standard)	6.0-1 (standard)
Pistons	Aluminum	Aluminum
Cylinder Head	Aluminum	Cast Iron
Brakes	Hydraulic	Hydraulic
Gear Ratios	4.55-1 without O.D. Trans. 4.7 with O.D. Trans. Mountain, 4.7-1 without O.D. Trans.	4.55 to 1 Mountain, 4.82 to 1
Camshaft Drive	5.1-1 with O.D. Trans. Gear	Gear
Oil Capacity	8 qts.	5 1/2 qts.
Fuel Capacity	18 gallons	18 gallons
Tires	6.50 in. by 16 in. (7.00 in. optional)	6.00 in. by 16 in. (6.50 in. optional)
Battery Capacity	105 amp. hr.	105 amp. hr.

vidual front wheel suspension, which has been used for two seasons, is continued as standard on the President and optional on the Dictator. Direct-acting shock absorbers are used front and rear, being built-in as a part of the linkage on the "planar" front axle.

Ross cam-and-twin-lever steering gears are fitted on all 1937 models. The steering arm travel is 100 deg., as compared with the former travel of 80 deg., producing a greater mechanical advantage and minimizing the transmission of road shock. The Ross gear is particularly effective for parking, since the movement of the wheels in the parking range is almost doubled.

President models will feature the Delco-Remy shunt-wound generator with automatic current and voltage control, which is claimed to assure a maximum charging rate regardless of road speed, but to prevent over-charge at all times. Auto-Lite ignition units are continued on the Dictator.

The automatic "hillholder," a safety feature introduced by Studebaker last year, is continued on all models. Dictators are fitted with a rubber-insulated universal joint recently developed by Thompson Products. An over-running



(Left) Longitudinal section of overdrive

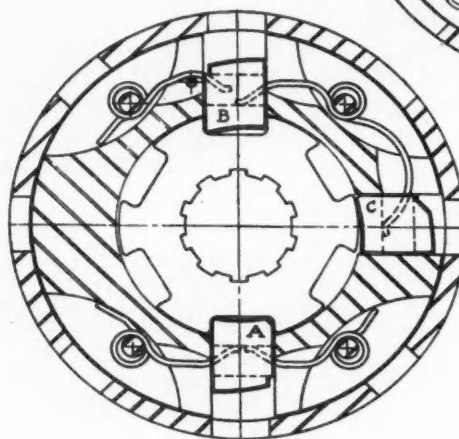
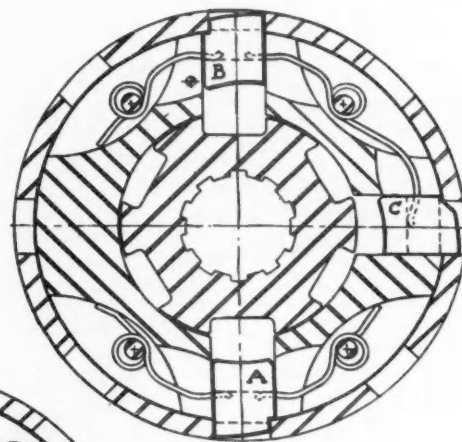
starter clutch, manually engaged on Dictators and with dash-button control on Presidents, tends to make starting positive in cold weather. The clutch permits continuous cranking until the speed of the crankshaft exceeds the speed of the cranking unit.

An improved gear shift, unusually light, is obtained through a new synchronizer unit on all models. This synchronizer unit embodies a floating ring having a blocking action and carrying a synchronizing cone. It prevents shifting to second gear until the engaging gears, i. e., the synchronizing-sleeve internal gear and the second-speed mainshaft gear, are running at approximately the same speed.

The new overdrive transmission on the President can be cut in or out at any speed above 35 m.p.h. To cut in the overdrive, the foot is lifted quickly from the accelerator and then applied gradually. To cut it out, the foot is lifted and then applied quickly. The unit is compact, light and quiet, and by making it possible to engage the direct drive whenever desired, gives the same excellent acceleration as the conventional gear—in either top gear or second—whenever needed. While the general principles of operation are substantially as before, the overrunning roller clutch functions only temporarily after disengagement of the overdrive, to pick up the direct drive. The car coasts against the engine compression in all speeds, just as with a conventional transmission.

The drive is taken by the two oppositely located pawls, the outer ends of which are designed to engage slots in the planetary ring gear which provides the overdrive. When these pawls are in

(Right) Transverse section of overdrive showing the centrifugal pawls in overdrive position



(Left) Transverse section of overdrive showing the centrifugal pawls in direct drive position

their inner position, they engage wide slots in the periphery of the inner member of the roller clutch, thus locking the clutch and providing a positive direct drive.

The springs on one of the two pawls, A, are slightly heavier than those on the opposite pawl, B. On accelerating toward the cut-in speed, pawl B therefore comes out of direct engagement first and is ready to engage the outer shell, but cannot do so until pawl A releases the direct drive at or above the cut-in speed, when the driver takes his foot off the throttle.

Conversely, on decelerating through the cut-out speed pawl A withdraws from its outer position ahead of pawl B

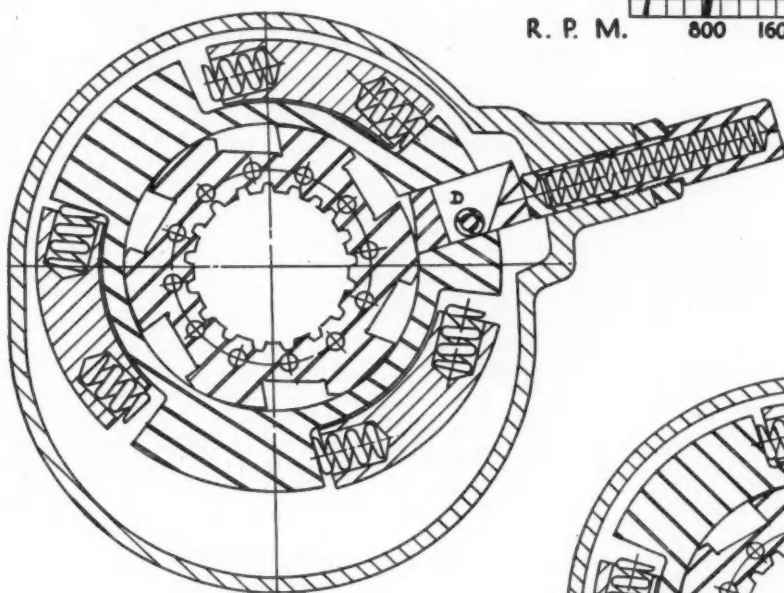
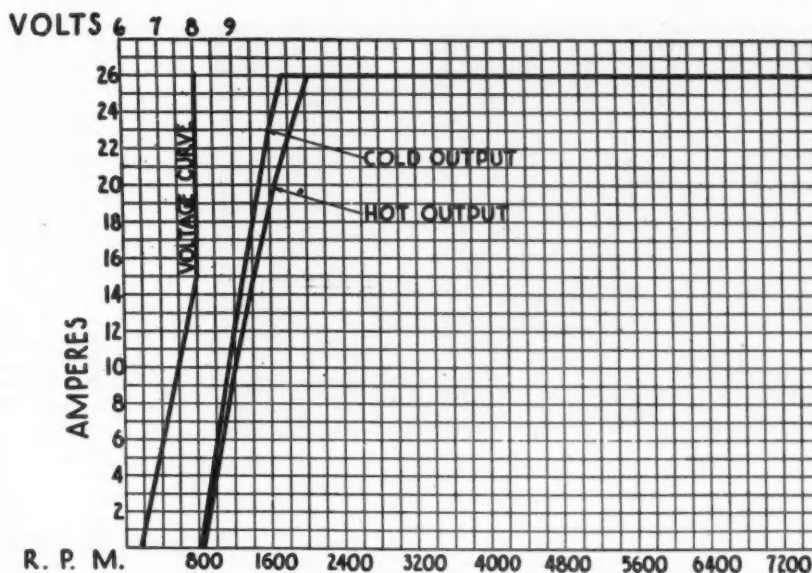
and is ready to drop into one of the slots of the direct drive cam when pawl B lets go at its cut-out speed.

Intermediate between pawls A and B is a third pawl, C, which carries a very light spring and therefore tends to engage the outer ring at rather low speeds. Due to its outer contour, it cannot drive the car, and merely serves to maintain a connection between the overdrive train and the propeller shaft during those brief intervals when pawls A and B are both completely disengaged.

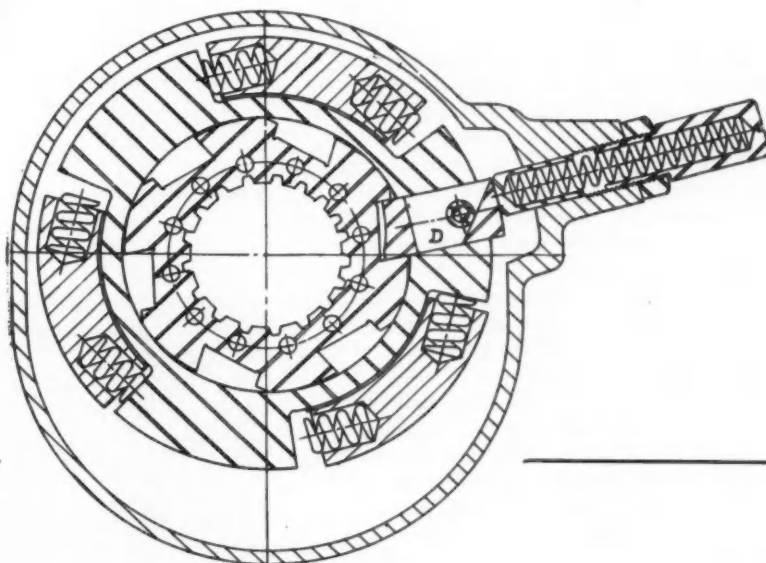
To make it possible to get out of overdrive at speeds above the normal cut-out speed, means are provided for releasing the sun gear of the planetary

(Right) Graph of variation of generator voltage and charging current with engine speed

Transverse section taken along line B-B in the longitudinal section showing mechanism in direct drive position



Transverse section taken along line B-B in the longitudinal section showing mechanism in overdrive position



train, so that it will rotate freely. The drive is then taken through the roller clutch.

The sun gear is carried at its forward end in a slotted head, which in turn is mounted in a member that is stationary except for a slight oscillation against buffer springs. This oscillating member carries a non-rotating pawl, *D*, the inner end of which is adapted to engage the slotted head on the sun gear.

One face of pawl *D* has an inclined surface which normally rests against a stationary stud. When the drive is through the overdrive gears, the oscillating assembly is moved in a clockwise direction against the spring

buffers and the inclined surface of the pawl is then in such a position relative to the stud as to permit full depth engagement with one of the slots in the sun gear head, thus taking the drive reaction of the sun gear.

Should the throttle be closed, the resulting coasting load will reverse this reaction and an inclined surface on pawl *D* will ride up the stationary stud, lifting the pawl partially from its slot.

Owing to the shape of the inner end of this pawl it is lifted clear of the slot on the drive side, but not on the coast side.

Should the engine now be quickly accelerated, the inward pressure of the pawl spring, which is mounted so as to bear against the outer end of the pawl, will be insufficient to overcome the inertia of the oscillating assembly and the slotted sun gear head will move the



Rotary door latch with (at left) detail showing principle of operation

pawl out into a fully-released position.

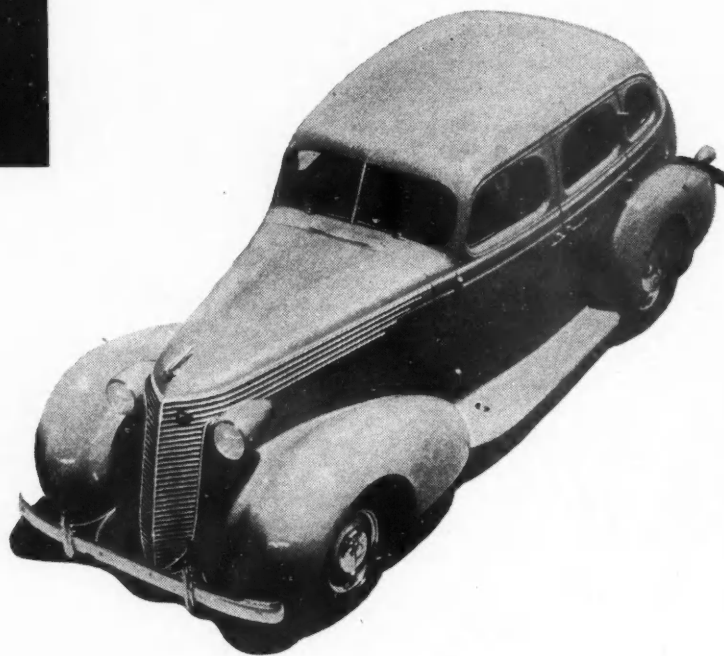
The parking brake lever has been moved to a position just below the instrument panel at the left of the wheel, clearing up the compartment and eliminating the obstruction at the left front door. Hydraulic brakes are standard equipment.

Use of the hypoid rear axle and double-drop frame has enabled body engineers to increase leg room to 47 in. in the sedan rear compartment. Front and rear door openings are 44 in. from top to bottom. Luggage compartment volume has been increased by using a flat type of gas-tank. Bumper jacks are now standard equipment.

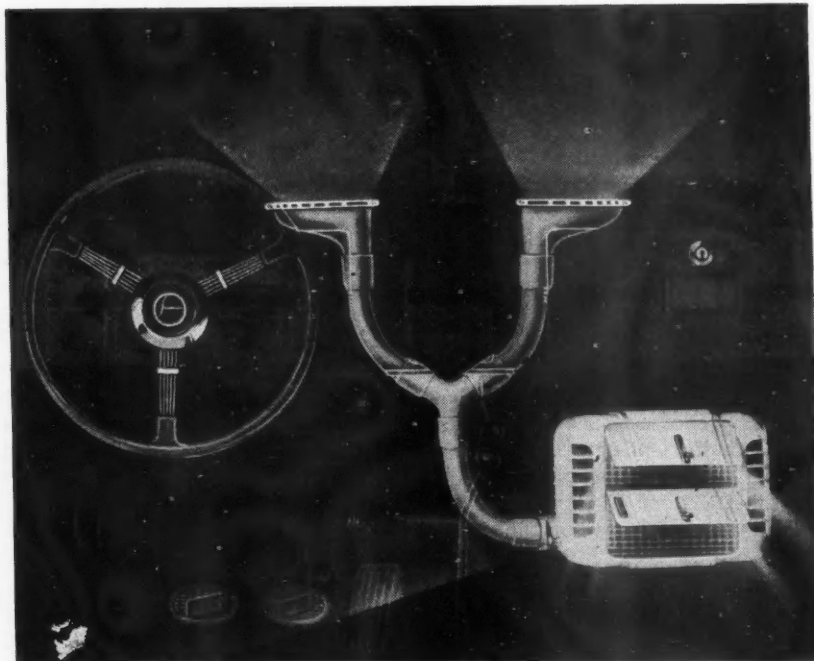
One of the most interesting of the new features is the adoption of rotary door latches which require only a finger tip pressure for engagement. As the door swings shut, the rotary element engages automatically. Any movement of the body automatically tightens the latches, thus compensating for wear and preventing rattle due to looseness.

Another improvement of interest to the motorist is the built-in defrosting arrangement consisting of two air ducts in the top of the instrument panel opening just below the rear of the windshield. These ducts may be connected with the car heater, thus sending a current of warm air against both sides of the windshield.

Body shells of the 1937 Studebakers are of all-steel construction. Body sides, top, and underbody are all insulated against noise, heat and cold. Interiors reflect the styling of Miss Helen Dryden, whose work proved so effective on last year's Presidents. Instrument panels and dials have been redesigned to harmonize with the new interiors.



The four-door Studebaker sedan. Deep, one-piece fenders are faired to reduce wind resistance and to blend with radiator contours.



Phantom view of defrosting installation

The Horizons of Business

By Joseph Stagg Lawrence

Vested Interests

AS the political campaign gathers momentum for the final November crescendo facts are developed which reveal in unpleasantly startling fashion new facets of the phrase "vested interests." A "vested interest" may be defined as a privileged position occupied by prescription. Which simply means that an individual, institution or group occupies a position that yields power, material advantage, prestige or all of these not by virtue of merit but solely because it is already there. Nations acquire recognized title to territory through continuous occupation. The property rights of individuals and corporations are often recognized for the same reason. The world does not clean the slate of privilege each year and compel everyone to start afresh. In general the fixation of rights through prior exercise is a good working rule and conducive to stability.

Periodic Purgatives

In the field of politics prescriptive privileges were early recognized as vicious. A vested aristocracy soon showed signs of dry rot. A royal house, however vigorous the original founder, eventually degenerated. Groups that attained power in whatever manner or from whatever source soon decayed. The perception of this led the framers of our Constitution to establish a form of government which made periodic change of administration not only possible but probable. The first President emphasized this wholesome principle by refusing to run for office a third time. The wider the sphere of government and the more complicated its functions the more necessary a periodic purgative of the type provided by our elections. In other countries not similarly gifted with a basic law and national character such a cathartic is provided by revolution.

The Two Party System

Any attempt by a government to perpetuate itself is a violation of American principles. It is in this light that New Deal propaganda, the distribution of alms to alleged victims of the drought

and the payment of living wages to idle workers who would rather not work must be regarded. Is publicity an attempt to render account for a high stewardship or an effort to secure re-election? Is the payment of an agricultural subsidy actuated by a desire to preserve a basic industry or is it designed to win votes? Is the payment of relief necessitated by the plight of the victims or dictated by ambition to return to office? Whether we have here a sinister vested interest seeking to entrench itself in office is a serious question. There is evidence that such a purpose animates many groups within the government.

Social Workers

Ever since the State of New Jersey made relief a local problem it has been exposed to the withering fire of social workers who have shed audible tears for the distressed. As Governor Hoffman expressed it, every time a baby dies in the state it is due to flinty hearted legislators who refused to appropriate the necessary funds to continue relief on the scale to which social workers had become accustomed. That these social workers had an altogether impractical grasp of the relief problem in spite of their specialized training is beside the point. The point is that these workers had found a place for the exercise of their talents and authority. They liked it and at once identified their loss of power as a state calamity. They had become a vested interest and sincerely believed that the change which made them a divested interest was contrary to humane public policy.

PWA Careers

The PWA has likewise attracted a special group of executive and professional workers who regard the PWA as a permanent function of the government. They are looking forward to careers in the PWA! The President has given this some encouragement by urging that the Federal Government appropriate not less than half a billion dollars annually for public works. Wise Republican politicians admit that the PWA and the whole structure of relief

is something which cannot be liquidated overnight, that its reduction will be an extremely ticklish job, not unlike the fabled task of belling the cat. The CCC represents a huge investment and carries a large organization which hardly seems temporary in character.

An Active Skull

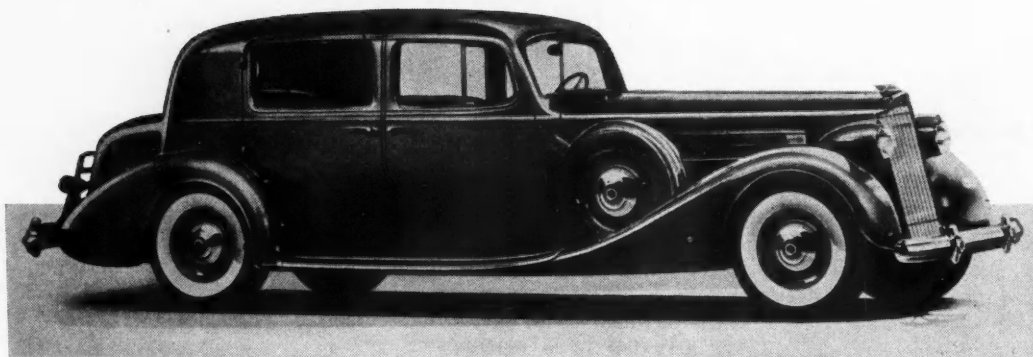
The tenacity of vested interest is especially marked in the Department of Agriculture swollen during the past three years by a horde of related credit agencies, and by the AAA now operating as the SCA. It is possible that the zeal of the beneficiaries here has overreached itself. The drought gave these boys their cue. They proceeded at once with radio programs, pictures and releases to dramatize the miseries of the afflicted regions. Believing with the sage Chinese that a picture is worth a thousand words they distributed photographs of drought scenes. It seems that the art department was short of props and had to use the same steer skull in a number of scenes. An impious opposition press quickly discovered the deception and made the most of it. Transparent as this bit of trickery may seem it is well not to judge too harshly the responsible shavetails of the New Deal. After all they are merely imitating their superiors. They have jobs with more pay than they can get in private life and with much more authority than they could ever acquire in a private capacity. They want to lose their privileged positions as little as their superiors. They constitute an unashamed vested interest.

The Permanence of the Emergency

It may be recalled that most of the measures creating these leech-like incumbents were based on the emergency. How many of these emergency agencies have been liquidated? Only those which the Supreme Court invalidated. In some of these precious jobs were preserved through complaisant circumvention of the court by Congress. Actually the number of emergency jobs as well as the amount of emergency expenditures is increasing though the country is rapidly approaching normal levels

(Turn to page 326, please)

Six and Super Eight Augment



The 1937 Packard Twelve Club sedan has a built-in trunk

OF greatest interest, no doubt, in the Packard announcement for 1937 is the fact that a new six-cylinder model has been added to the line, smaller than any of last year's models and lower-priced than any car sold under the Packard name in the history of the company.

The 1937 Packard line will feature the following four basic models: The new Packard Six, the Packard 120, and the senior line consisting of an entirely new Packard Super-Eight, and the Packard Twelve. By the time these cars reach the dealers' showrooms they will have had the benefit of 2,000,000 hard-driven miles of tests on the road and the proving ground.

Wheelbases of the new line are as follows: Six, 115 in.; Model 120, 120 in. standard, 138 in. for the seven-passenger sedan and the seven-passenger limousine; 158 in. for the hearse and ambulance; Super-Eight, 127, 134, 139 in.; Twelve, 132, 139 and 144 in.

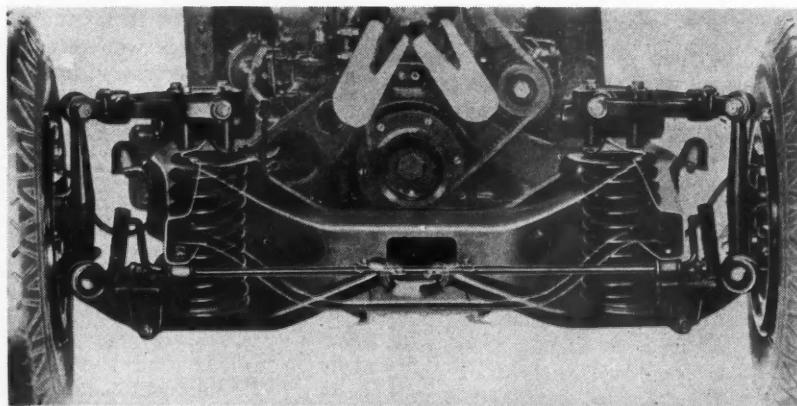
Although Packard carried through a modernization program when the 120 was first introduced, two years ago, the company has just revamped the 120 plant to accommodate the new lines and novel production equipment to be used for both the Six and the 120.

Perhaps the best way to visualize the engineering philosophy on which the Packard line is based is first to couple the new Six and the 120 as constituting the light series and the Super-Eight and Twelve as the senior group.

Considering first the powerplants, the new Packard Six has L-head cylinders of 3 7/16-in. bore by 4 1/4-in. stroke, giving 237 cu. in. displacement. With cast iron head and a compression ratio of 6.3 to 1, it is rated 100 hp. at 3600 r.p.m.; aluminum heads with 6.75 com-

pression ratio are optional. Many of the production operations will be performed on the same equipment that is used for the 120 engine. The latter is continued unchanged except for minor details. It is an eight-cylinder in-line L-head design of 3 1/4-in. bore by 4 1/4-in. stroke (282-cu. in. displacement), and is rated 120 hp. at 3800 r.p.m., with aluminum head and a compression ratio of 6.5 to 1.

and a compression ratio of 6.8 to 1. The crankcase is made of two aluminum castings, in upper and lower sections. The Twelve engine remains generally the same, but has seen numerous refinements. It has a modified L-head V-type block, with the cylinder banks set at an angle of 67 deg. It is rated 175 hp. at 3200 r.p.m. Aluminum heads are standard, the standard compression ratio being 6.4, in addition to



Details of the Twelve Safe-T-Flex suspension showing the front sway bar

While the Super Eight last year carried an engine of 3 1/2-in. bore, this year's Super Eight engine is substantially the same as that used on the Eight of last season; that is, it is an eight-cylinder in-line L-head type of 3 3/16-in. bore by 5-in. stroke (320-cu. in. displacement), which is rated 135 hp. at 3400 r.p.m., with aluminum head

which two other ratios are available, 6.0 and 7.0.

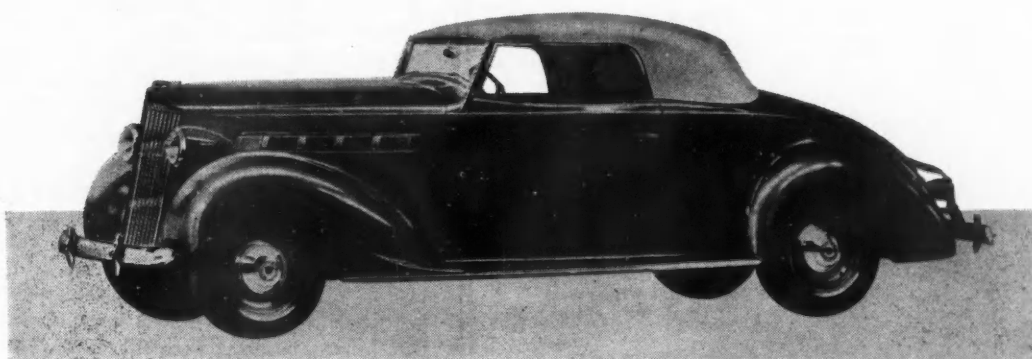
Returning to the general features of the whole line, we find that the Super Eight is an entirely new car, using the 320-cu. in. engine formerly used on the Eight, in improved form. It is lighter than last year's Eight by some 250 lb., which, together with the increased en-

Packard Line

gine output, improves both the top speed and the acceleration. Features common to the entire line include hypoid rear axles (the same axles are used in the Six and the 120); Safe-T-Flex front suspension (developed in connection with the 120 and now used

1937 Packard Body Models

120	Six	Super-Eight and Twelve
5-Pass. Touring Sedan	5-Pass. Touring Sedan	5-Pass. Formal Sedan
5-Pass. Sedan	5-Pass. Sedan	5-Pass. Touring Sedan
5-Pass. Club Sedan	5-Pass. Club Sedan	7-Pass. Touring Sedan
5-Pass. Coupe	5-Pass. Coupe	5-Pass. Club Sedan
2-4 Pass. Coupe	2-4 Pass. Coupe	5-Pass. Coupe
2-4 Pass. Convert. Coupe	2-4 Pass. Convert. Coupe	2-4 Pass. Coupe
5-Pass. Convert. Sedan	2-Pass. Coupe	2-4 Pass. Convert. Coupe
2-Pass. Coupe		5-Pass. Victoria
		5-Pass. Convert. Sedan



Shown here is the convertible coupe of the new six-cylinder Packard model

on all models; interchangeable between the Six and the 120, but heavier in the Senior line). Sway bars are provided at both front and rear in the Twelve, at the rear only in the other models.

Hydraulic brakes with Centrifuse drums and Packard dust seals are standard. On the Twelve the braking system is augmented by vacuum power in conjunction with a reservoir tank to permit operation when the engine is stopped. All models feature improved throttle action. On the Twelve the clutch also is power-actuated, and the spring pressure has been increased slightly over last year, to reduce the sensitivity. In the Senior line there are additional anti-friction bearings in the clutch and brake system.

Welded frame construction, featuring a welded I-beam section for the X

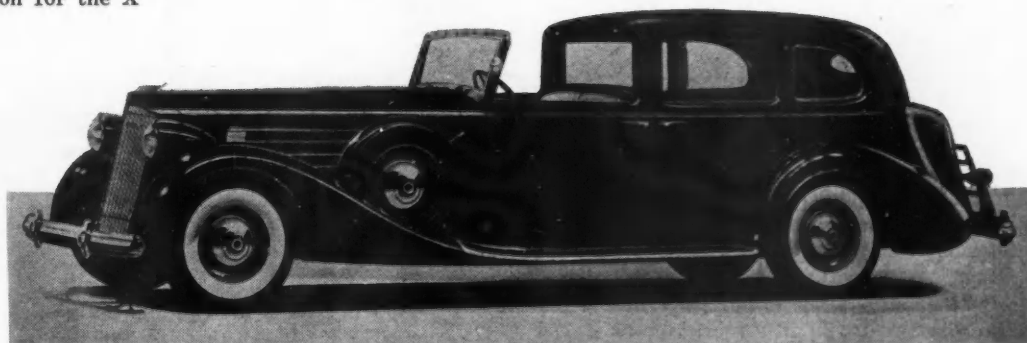
member, is carried through the entire line. In the Senior chassis the torsional stiffness has been increased 400 per cent by the use of this feature.

Selective, silent, synchro-mesh transmissions with helical gears are standard. Only two sizes of steering gear are used—one for the Six and 120 lines, the other for the senior cars. All models have center-point steering. Experience with this type has shown the necessity for precise control and calibration of the elasticity of the whole steering system, and such control is now applied to all models. The electrical systems have been improved. All engines have 10-mm. spark plugs. Delco-Remy generators on the Six and Auto-

Lite on the 120 have vibrator voltage control. Delco-Remy shunt-wound generators with voltage-current control are standard on the senior line. Hi-level batteries requiring attention only a few times a year (which proved successful last season) are continued on all former lines. A 15-plate battery is used on the Six, a 17-plate on the 120, and a 21-plate on the seniors. Light circuits are now protected by thermostatic cut-outs instead of by fuses. Thermostatic control is used also for the cigar lighters, the current being cut off automatically when the proper temperature has been attained.

Body styling shows many detail changes. Bodies for the Six and 120

The Packard Twelve town car with built-in trunk



Specifications of New Packard Six and Super Eight

	Six	Super Eight
Engine	115-C	1500-1-2
Type	L Head-Vertical-En bloc	L Head-Vertical-En bloc
Bore	3 7/16 in.	3 3/16 in.
Stroke	4 1/4 in.	5 in.
Displacement	237 cu. in.	320 cu. in.
Power output	100 b.h.p. at 3600 r.p.m.	135 b.h.p. at 3200 r.p.m.
Compression ratio (std.)	6.3 to 1	6.8 to 1
Pistons	Auto thermic aluminum alloy with strut	Aluminum alloy with strut
Piston weight with rings and pin	25.4 oz.	24.1 oz.
Oil ring; number and width	1; 3/16 in.	2; 5/32 in.
Compression rings; number and width	2; 1/2 in.	2; 1/8 in.
Piston pin; type and dia.	Floating; 3/8 in.	Floating; 3/8 in.
Connecting rod C to C length	7 11/16 in.	10 1/2 in.
Connecting rod weight	2 lbs. 1/2 oz.	2 lbs. 9/4 oz.
Rod bearings; type, material, dia. and length	Detachable shell; Babbitt; 2 3/32 in. by 1 1/2 in.	Detachable shell; copper-lead alloy; 2 3/16 in. by 1 3/32 in.
Main bearings; number, material, diameter	4; Babbitt lined steel shell; 2 1/2 in.	9; Babbitt lined steel shell; 2 1/2 in.
Inlet valves; material	Chrome nickel	Chrome nickel
Valve head diam. (inlet)	1.575 in.	1 21/32 in.
Exhaust valves; material	Austenitic steel	Austenitic steel
Valve head diam. (exhaust)	1.406 in.	1 15/32 in.
Fuel feed	Mechanical pump AC in combination with vacuum pump	Mechanical pump AC in combination with vacuum pump
Carburetor; make, size and type	Chandler-Groves; 1 1/4 in. downdraft single barrel	Stromberg; 1 1/4 in. Duplex downdraft
Air cleaner and silencer	AC—oil bath type	AC—oil bath type
Ignition coil	Delco-Remy 539-N on cylinder head	Delco-Remy 539-K on cylinder head
Spark plugs; make, type and size	AC; Y-4; 10 mm.	AC; Y-4; 10 mm.
Battery	Willard 15 plate, 94 amp. hrs.	Hi Level Presto-lite and Delco 21 plate, 150 amp. hrs.
Starter motor; make and model	Delco-Remy; 739-F	Delco-Remy; 729-H
Generator; make, model and drive	Delco - Remy; 948 - U; Belt	Delco-Remy; 961-J; Belt
Clutch, type	Single dry plate	Single dry plate
Transmission; type, gear teeth	Selective - Silent - Synchronized; helical	Selective - Silent - Synchronized; helical
Transmission; Standard ratio to 1:		
High	1.00	1.00
Second	1.53	1.53
First	2.43	2.46
Reverse	3.18	2.88
Universals	"Mechanics" roller bearing type	Universal Products — roller bearing type
Rear axle; type	Angle set—semi-floating	Angle set—semi-floating
Gear ratio, standard	4.36 to 1	4.69 to 1
Tires	16 by 6.50; 4-ply; 22 lbs.	16 by 7.50; 6-ply; 24 lbs.
Wheels; make, type	Motor Wheel; demountable disc.	Motor Wheel; demountable disc.
Rear springs	54 by 1 1/4 in.	58 in. by 2 in.
Front springs	5.17 in. O.D.; coil	5.3 in. O.D.; coil
Steering gear	Packard, worm and double tooth roller	Packard, worm and double tooth roller
Steering gear ratio	18.4 to 1	20.5 to 1
Brakes	Internal expanding 4 wheels; hydraulic 2 shoe	Internal expanding 4 wheels; hydraulic 2 shoe
Brake drums	11 in. Centrifuse	14 in. Centrifuse
Brake lining; size	1 1/4 in. by 3/16 in. by 13 in.	2 1/4 in. by 3/16 in. by 13 in.
Braking, effective area	168 sq. in.	259 sq. in.
Wheelbase	115 in.	Model 1500—127 in. Model 1501—134 in. Model 1502—139 in.

Note: All Packard models now supplied with independent parallelogram front suspension.

frontal width. Automatically controlled shutters are standard on the senior lines. Louver treatment on the Six is the same as last year's 120, which the Six closely resembles in appearance. The 120 has a similar louver treatment to last year's Eight, while the Super-Eight carries a refinement of the former design and the Twelve remains the same.

Front doors are hinged at the front pillar on all models, using the concealed hinge developed for the 120 last year. Trunks are built-in and very roomy, with a single door hinged at the top. The former roof construction with built-in radio antenna is continued on the entire line.

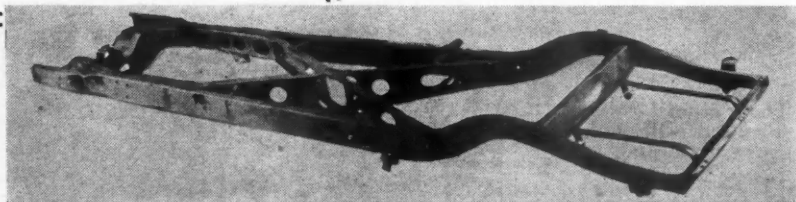
A new adjustable-seat arrangement is common to all models. A single movement permits adjustment both fore-and-aft and up-and-down, to accommodate passengers of different sizes. Thus when the seat is moved forward for "shortleg adjustment," it also moves upward and changes the inclination of the back to suit.

On the 120 the opening of the windshield has been increased by 1 1/4 in. to increase the range of vision. On the senior lines all controls except the horn button have been moved from the steering wheel to the instrument panel. New instrument board treatment is a feature of the Six and the 120. A slidable ash receiver is now provided which remains on the panel even when a radio is installed. All models have provision for a defroster hook-up on the instrument board which may be used with either a hot-water or an exhaust-type heater.

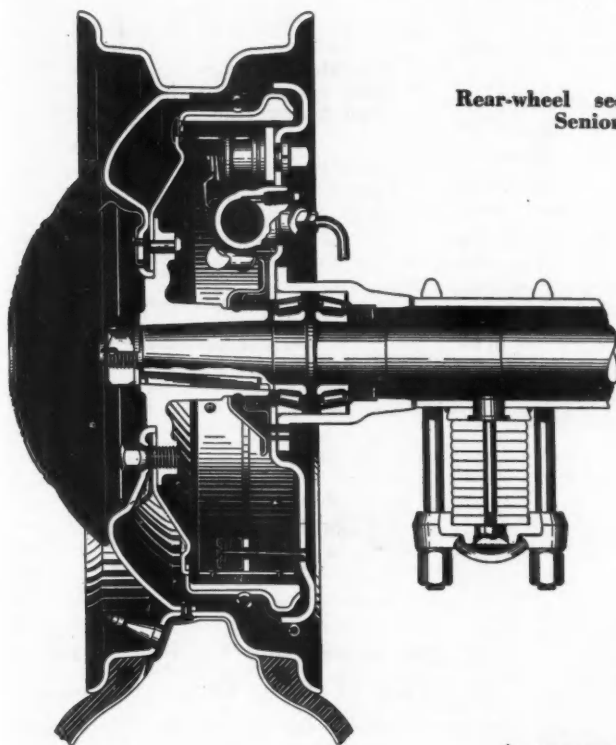
On the senior line the trimming has been made more luxurious than ever, by the use of a pillow-type upholstery treatment. The Packard system of body ventilation is continued unchanged. All bodies are insulated against noise, cold and heat. Underbodies are sprayed with a non-hardening composition for sound-deadening and dustproofing.

Engine blocks are made of a chromium-and-nickel semi-steel alloy. Oil-bath air cleaners are used on all models except the Twelve, which continues the type formerly used. Vibration dampers are standard throughout, as is the

are identical, except for trim and interior details. Senior bodies are of the same composite construction as previously, but somewhat lighter, due to refinement of structural details. Radiator treatment on the senior lines has been improved by slightly reducing the



View of frame used in the Six models showing the I-beam X member



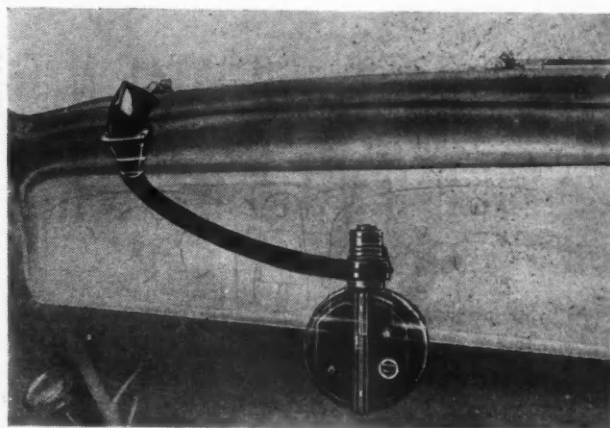
Rear-wheel section of the
Senior line

two-sprocket chain drive at the front end. All engines have improved starting and idling characteristics. The senior line is fitted with a new type oil cooler having all joints copper-brazed to assure trouble-free service. Vacuum spark control in addition to governor advance is standard on all models except the Twelve, which has governor control only.

All models except the Six are now fitted with twin-tandem, tuned-resonance mufflers. The Six uses the same type of muffler except that it is a single unit.

Engines are all fitted with the new

Arrangement of
the defroster with
outlet on left side
of instrument
board



X-90 damper-type piston rings, which Packard has found to greatly reduce oil consumption, particularly at high speeds, and to improve cylinder life. The Six and 120 use three rings—two 70's and one X-90; the Super Eight has

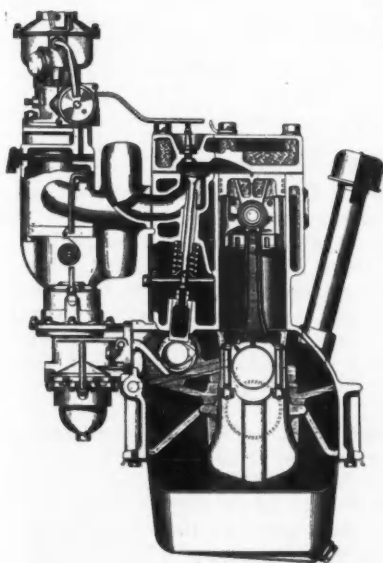
four rings, one plain compression, one 70, one 85, and one X-90; the Twelve has four rings, one plain, two 70's and one X-90.

The Six is fitted with the new Chandler-Grove downdraft carburetor with concentric float and built-in automatic choke. Pistons for the Six are of the new Bohn autothermic type, slotted, slightly cam-ground and tin-plated. All other engines have the former aluminum-alloy pistons with strut.

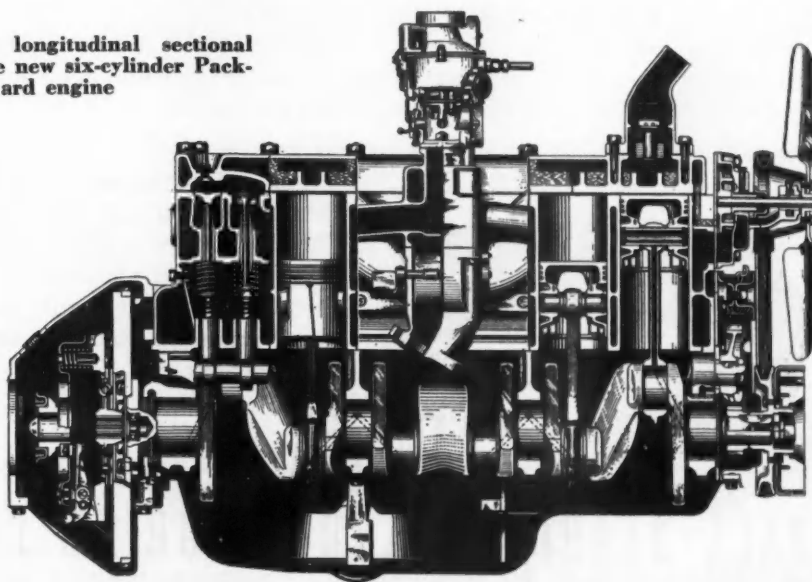
On the Super Eight, pressure lubrication has been extended to the rocker-arm bearings, to assure an ample supply of oil to these bearings at low operating speeds. The cooling capacity has been increased on all models, and careful attention has been given to de-

tails that affect the tendency to vapor-lock. Both the Six and the 120 are fitted with a new fuel pump having greater vapor capacity and improved cooling.

All engines are fitted with precision-



Cross and longitudinal sectional
views of the new six-cylinder Pack-
ard engine



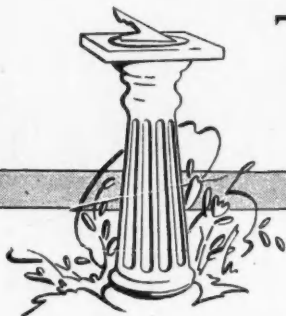
type interchangeable main and connecting rod bearings, the bearing material being a babbitt alloy in the Six and 120, and copper-lead in the senior engines. In senior engines the crankshaft journals are hardened by an induction-heating process developed by the Ohio Crankshaft Co. This produces a heavy, uniformly hard case which in combination with the copper-lead bearings increases bearing life.

Owing to the new front-end construction, the number of lubrication points has been reduced to three. As a consequence, lubrication is needed only at long intervals, and the Bijur central

chassis lubrication system, formerly used on both the Eight and the Twelve, has been dropped.

Plain disc wheels are standard for the entire line, but wire wheels are obtainable on the Twelve and steel-spoke disc wheels on the Six, 120, and Super Eight. Sixteen-inch wheels are standard for all models, permitting of the use of low-pressure tires. Tire sizes are as follows on the different models: Six, 6.50-16; 120, 7.00-16; Super Eight, 7.50-16; Twelve, 8.25-16. Inflation pressures range from 32 lb. per sq. in. for the rear tires of the Twelve to 23 lb. per sq. in. for the front tires of the Six.

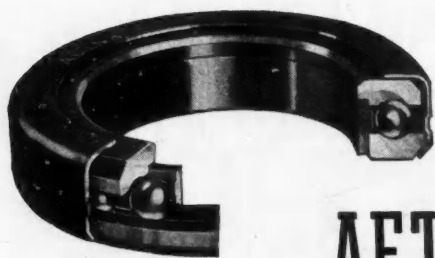
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THE fact that Aetna T Type Clutch Release Bearings have been adopted as standard by practically all leading manufacturers of cars and trucks in the big-volume field should be sufficient proof to you of their superiority in design and fairness of price. As for performance, consider the time and the millions of merciless miles these bearings have been on the job in newspaper fleets, taxicabs, trucks assigned to the toughest jobs on wheels, passenger cars that have undergone every test the nation's proving ground can produce.

When you add this ability to "take it" to their unique design which

eliminates damaging eccentric thrust and permits lubrication "for life" there's little wonder why they've won industry-wide preference. If you aren't using them, write for complete engineering data.



AETNA

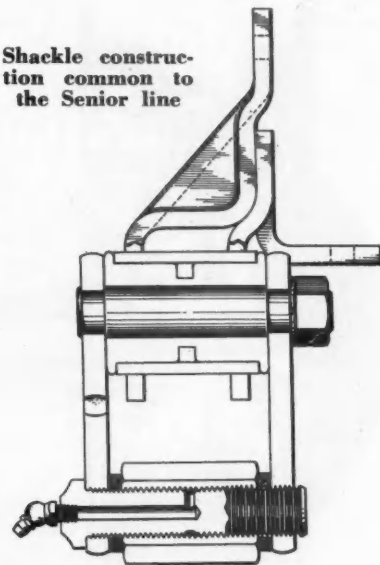
BALL BEARING MANUFACTURING CO.

4608 Schubert Avenue, Chicago, Ill.

Detroit Office, 7310 Woodward Ave.

September 5, 1936

Shackle construction common to the Senior line



Buick Supplies Equipment for Flint Club's Driver School

One of the outstanding automobile driver schools of the country, organized by the Safety Department of the Flint, Mich., Automobile Club, a member of the American Automobile Association, with the cooperation of the engineering department of the Buick Motor Co., will begin operation early in September, it was announced today by W. F. Isherwood, club president.

The school is one of the first of its kind in the country, according to Mr. Isherwood, and is distinguished by having more than \$30,000 worth of special automotive equipment, supplied by Buick engineers, which will be used in class room instruction.

This material includes 1936 Buick automobile show equipment, consisting of cutaway chassis, engine, steering gear and transmission. In addition, an automobile will be supplied the club in which its students will receive driving instruction and a minimum of 12 hours actual driving and observation.

The equipment was turned over by Charles A. Chayne, Buick chief engineer, who also helped develop the course of instruction that will be given each student.

George M. Mackenzie

George M. "Doc" Mackenzie, Eddington, Pa., fourth ranking driver in A. A. A. national racing competition, died in a Milwaukee hospital following an accident at the State Fair Park dirt track, Aug. 23. The crack-up was the result of a tangle between Mackenzie's car and that of George Connors, during the early stages of the race.

"Doc" Mackenzie placed third in the Memorial Day Indianapolis Race this year, driving the car that brought Kelly Petillo home first in 1935. Mackenzie also held the 1935 Eastern dirt track championship.

Automotive Industries

Hails W-O Reopening

(Continued from page 294)

David R. Wilson, president of the new company, who also is trustee under the court operations, is going ahead rapidly with the retooling of the plant so that new cars may roll off the lines by Nov. 5. The run of Willys 77's authorized by the court several months ago is virtually completed.

The new car will have a tread about six inches wider than the former car but will retain the same engine and mechanical features.

It will be the policy of the company to make "one chassis at the lowest possible price consistent with good workmanship and good performance" in the words of Ward M. Canaday, who will be chairman of the board of the new company. Mr. Canaday headed Empire Securities, Inc., which purchased 97 per cent of creditor claims and 70 per cent of bonds to bring about the reorganization plan.

Securities of the old and the new company both jumped in price immediately after the signing of the court order by Judge Hahn.

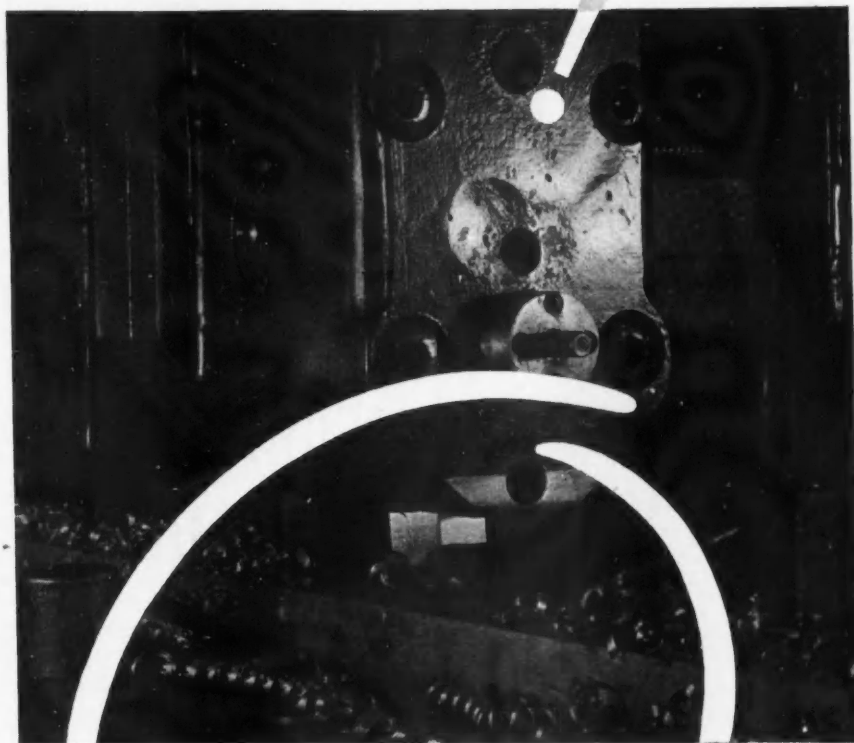
Bonds were reported to have been offered at 105 with bids at 95, old preferred stock at \$1.25 a share and common at 10 cents a share. These prices were merely for the rights to subscribe to new stock in units of one common and one preferred at \$10. On a "when issued basis" the new common stock was traded over the counter in Toledo at 2¾ bid, 3 asked, and preferred was at 7½ bid and 8½ asked.

The new company will issue 1,500,000 shares of its one dollar par common to Empire Securities in consideration of the consolidation and merger; authorize issuance of 150,000 shares and payment of \$175,000 for all expenses in connection with underwriting and subscription of stock; reserve 150,000 shares for future sale to executives and employees, 700,000 shares for conversion of preferred stock, and will sell for cash 350,000 shares of common and 350,000 shares of preferred to holders of subscription rights at \$10 a unit to furnish \$3,500,000 of new working capital. E. H. Rollins & Sons, New York, are underwriters.

Civic appreciation of the new Willys-Overland Motors, Inc., was expressed at a testimonial dinner for David R. Wilson given by the Chamber of Commerce on Thursday, Sept. 3. Representatives of the 106 concerns which do business locally with Willys-Overland and of many civic and business organizations attended the dinner.

Mr. Wilson is the second in his family to help rescue the Willys-Overland from financial difficulties. His brother, Charles Wilson, also his partner in the organization of the Wilson Foundry & Machine Co., Pontiac, Mich., as vice-president of Willys-Overland in 1921

Only HIGH SPEED TOOL STEEL IS SUITABLE CUTTING MATERIAL ON PLANERS



... and on this particular job
GREY CUT COBALT is
cutting on both forward
and backward strokes ...

VANADIUM-
ALLOYS STEEL CO. LATROBE, PA.

restored it to a sound position after the company had become waterlogged with bank debt in the post-war expansion period.

Mr. Wilson is a machinist. He learned his trade with the Diamond Match Co. at Barberton, Ohio. In 1901 he was superintendent in the Olds Motor Works in Lansing. Later he joined his brother in the foundry business furnishing motor blocks to car makers. They have made every motor block for Willys-Overland since 1907. Mr. Wilson is given most of the credit for keeping the plant a going concern during the last three years.

Passenger Car and Truck Production—U. S. and Canada

	July, 1936	June, 1936	July, 1935	First Six Months 1936	First Six Months 1935
Passenger Cars—U. S. and Canada:					
Domestic Market—U. S.	358,102	357,651	259,285	2,285,279	1,992,534
Foreign Market—U. S.	14,300	18,243	15,059	132,270	129,237
Canada	8,192	13,126	9,371	94,556	98,772
Total	380,594	389,020	283,715	2,512,105	2,220,543
Trucks—U. S. and Canada:					
Domestic Market—U. S.	58,113	64,461	45,419	431,591	356,778
Foreign Market—U. S.	10,484	12,600	12,346	80,735	71,815
Canada	2,283	3,274	3,817	21,867	25,689
Total	70,880	80,335	61,582	534,193	454,282
Total—Domestic Market—U. S. ...	416,215	422,112	304,704	2,716,870	2,349,312
Total—Foreign Market—U. S. ...	24,784	30,843	27,405	213,005	201,052
Total—Canada	10,475	16,400	13,188	116,423	124,461
Total Cars and Trucks—U. S. and Canada	451,474	469,355	345,297	3,046,298	2,674,825



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Built as only
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Sedans, coupes, roadsters, trucks, busses—no matter what the automotive vehicle, there is a Mechanics Roller Bearing Universal Joint or Shaft Assembly for every requirement. Built as well as human experience and ingenuity can build, built by "Mechanics", these joints possess exclusive features and advantages which insure smooth running, promote long life and practically eliminate servicing. Mechanics Roller Bearing Universal Joints are simple, reliable, durable, and economical. All of their parts having any appreciable effect on balance are machined all over. Integral keys transmit driving torque. Ground pilots insure concentricity. Ample provision is made for easy lubrication. Assembly is simple. For the main drive, in steering gears, for driving air compressors, generators, fans—for every purpose that requires a universal joint "Make it a Mechanics Universal Joint". Investigate. Write, today, for complete information.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

September 5, 1936

Automotive Safety Progress

(Continued from page 295)

that "small plants, also, made the largest reductions in their rates over 1934."

Where the report goes into the experience in the various branches of the automobile industry, it says: "plants manufacturing and assembling automobiles had the lowest frequency rate, 12.43, and plants manufacturing stampings had the lowest severity rate, 0.88. Plants manufacturing stampings also made the best showings in comparison with 1934 by reducing frequency 14 per cent and severity 37 per cent."

In establishing its basis for time lost in the severity column, the council charge 6000 days for each case of death or permanent disability. In 1935 the automobile industry was charged with 16 such accidents, a third of which are said to have been the result of improper guarding of machinery. For disabling injuries, the council's statisticians charge a sliding scale of from 300 to 4500 days. These are termed as compensable accidents, and the report reveals "handling objects accounts for 23.2 per cent of all types." Also, the individual plants reported to the council that "lack of knowledge or skill" was responsible in approximately one-half of the serious injury cases.

Distribution of accident causes by types is broken down as follows: handling objects, 23.2 per cent; falls to a different level, 4.0 per cent; falls to the same level, 6.5; machinery, 14.0; vehicles, 19.3; using hand tools, 12.0; falling objects, 3.4; stepping on or striking against objects, 5.2; electricity, explosives, heat, 4.0; harmful substances, 3.1; all other causes, 5.3 per cent.

In its report, the council establishes an honor roll of companies within the industry that have achieved outstanding accomplishments in safety advancement. The basis of reckoning has been by groups, and the items considered have been: lowest frequency rate in 1935; lowest severity rate in 1935; greatest percentage improvement in frequency from 1933 to 1935; and greatest improvement in severity from 1933 to 1935. Names on this honor roll are:

Automotive Industries

Manufacture and Assembly:

Chrysler Corp. The Plymouth Motor Corp., which had the lowest frequency and severity rates among large companies; 4.74 for frequency, and 0.05 for severity. The Jefferson plant made the largest improvement in frequency rate among large plants, 49 per cent; and also the largest reduction in severity, 38 per cent.

Bellanca Aircraft Corp. The best 1935 record among small plants, operating 258,000 man-hours without a disabling injury. It also showed the greatest improvement in both injury rates since 1933, 100 per cent.

Bodies:

General Motors Corp. Detroit plants of Fisher Body Corp. had the lowest 1935 frequency rate, 2.48. Plant No. 23 of Fisher Body Corp. had the best 1935 record among small plants, 2.91 in frequency and 0.03 in severity.

Murray Corp. of America. This company's plants have the lowest severity among large plants, 0.04.

Budd Manufacturing Co. Largest reduction in frequency among large units since 1933, 63 per cent; also the greatest improvement in severity, 75 per cent.

Parts:

Motor Improvements, Inc. Lowest 1935 severity rate among small units, 0.16.

Stampings:

General Motors Corp. The Ternstedt Manufacturing Co. had the lowest 1935 frequency rate, 2.13.

Budd Wheel Co. Had the lowest 1935 severity rate, 0.11.

McCord Radiator Co. The Wyandotte plant achieved the best 1935 record among small plants, 15.22 for frequency and 0.47 for severity.

Motors Metal Manufacturing Co. Made the largest reduction in frequency since 1933 among small units, 43 per cent; and also the largest reduction in severity, 49 per cent.

The report also makes note of outstanding accomplishments as regards all-time no-injury records, representing the number of continuous man-hours without a disabling accident.

Manufacture and Assembly:

Chrysler Corp., at its Highland Park, Mich., plant, with 1,972,320 man-hours.

Body:

General Motors Corp., Fisher Body Co., St. Louis, Mo., branch, with 3,779,600 man-hours. Record began July 2, 1931, and continued until May 8, 1933.

Parts:

Barnes-Gibson-Raymond, Inc., of Detroit, Mich., with 686,140 man-hours. Record began December 11, 1930, and continued until Jan. 9, 1933.

: SLANTS:

(Continued from page 295)

months of daily service this truck has piled up a total of 38 miles on its speedometer. Every day the truck makes eight round trips. It backs up, non-stop, 35 ft. After it refuels a plane, it makes its forward run, also non-stop, of 35 ft. There it rests until it comes time to do it all over again.

"BRIDES OF NATIONS"—Endeavoring to outdo the "fur-fashion" review which was so successful a feature of the Chicago automobile show last year, the committee is planning this year to hold a parade of "Brides of the Nations." Al C. Faeh, show manager, announces that the promenade will be held twice daily, with more than 50 nations represented.

RECORD AIR TRAVEL—Scheduled air lines in the United States carried

110,690 passengers in July, the Bureau of Air Commerce, Department of Commerce, announced today. The passenger total was a new record for passengers carried in a month, and the first time the total for the domestic lines had passed 100,000 in a month. The new record follows upon record-breaking passenger totals in May and June. The bureau's monthly report, covering operations of 21 of the 22 scheduled air lines in operation within the borders of the United States during July, shows that these lines also carried 613,837 lb. of express. They flew 6,024,518 mi. and

44,308,455 passenger mi. The miles flown and passenger miles flown were new records.

2 FOR 1—If one truck tows another—the front wheels of the second being mounted on the rear of the first truck—is it one vehicle or two? A jury in Whitley, Ky., Quarterly Court called the combination two vehicles. The decision brought an acquittal for John Caulfield, charged with driving a truck which was over the legal length.

PIKE'S PEAK—The Pike's Peak Hill



LUBRICATION FOR "SHOCK CONDITIONS"

When starting from cold and before oil is circulating freely - - when the foot is lifted suddenly from the accelerator at high speeds - - when oil is washed from engine walls, pistons and rings due to excessive chocking - - when springs run dry and squeaks develop - - those periods when most wear takes place - - when need for a durable, stand-by lubricant is paramount - - then is when the graphoid surface instantly goes to work.

While the above conditions apply to engines in use, many manufacturers are taking advantage of the unique properties of "dag" colloidal graphite to initially protect their mechanical devices.

Oils charged with this material are ideally suited for set-up and assembly work. The self-lubricating surface formed on the friction parts shortens the limbering-up time and minimizes seizure and scoring. Write for free booklet.

Ask your oil supplier about his colloidal-graphited brands today

ACHESON COLLOIDS CORPORATION • PORT HURON, MICHIGAN

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dag
REG. U.S. PAT. OFF.
COLLOIDAL PRODUCTS

COLLOIDAL GRAPHITE

ACHESON COLLOIDS CORPORATION
Port Huron, Michigan

Please send gratis, story on "dag" colloidal graphite.

Name
Address
City

Climb, for 16 years the outstanding Labor Day feature of motoring competition, will be resumed on Sept. 7 after a year's layoff. Official approval was granted, this week, by the Contest Board of the American Automobile Association, national governing body of auto racing, according to Ted Allen, secretary. This year's climb up the treacherous 12-mile road will be conducted under the auspices of the Veterans of Foreign Wars, Lt. Marion L. Willis, Post of Colorado Springs, Colo. It is planned as a pre-convention feature of the veteran's national encampment to be held at Denver, Sept. 13 to 20. Three events are on the program,

an event for racing cars, a climb for stock automobiles costing less than \$1,000 and an event for stock automobiles of more than \$1,000.

New Budd Directors

George W. Norris, of Philadelphia, former governor of the Federal Reserve Bank of Philadelphia, and Matthew S. Sloan, of New York, chairman of the board and president of the Missouri, Kansas and Texas Railroad, have been elected directors of the Edward G. Budd Manufacturing Co. to fill vacancies on the board, it was announced last week. Mr. Norris also was elected

chairman of the Finance Committee, consisting of himself, Mr. Sloan and W. W. Colpitts, of New York.

Air-Conditioned Ambulances

A complete line of air-conditioned ambulances and funeral cars are announced by the Sayers & Scoville Co., of Cincinnati. Principal concern of the manufacturers is the application of the units in ambulances. It is said that the equipment is capable of reducing even extreme temperatures to a degree affording normal comfort. Sayers & Scoville have conducted intensive engineering research and experimentation into the practicability of air-conditioning for motor vehicles.

Studebaker Engineering Chief

H. S. Vance, chairman of the board of the Studebaker Corp., states that there has been no change of personnel following the resignation of D. G. Roos, formerly vice-president in charge of engineering. R. E. Cole remains chief engineer, the position to which he was appointed last spring.

Budd Dividends

Directors of the Budd Wheel Co. last week declared the regular quarterly dividend of \$1.75 per share, plus a participating dividend of 25 cents per share, on the first preferred stock of the company, payable Sept. 30, 1936, to holders of record at the close of business Sept. 16, 1936.

Bendix Plant Tooled for Versatility

(Continued from page 311)

Department inspectors and assure the safety of those who fly.

CONCLUSION

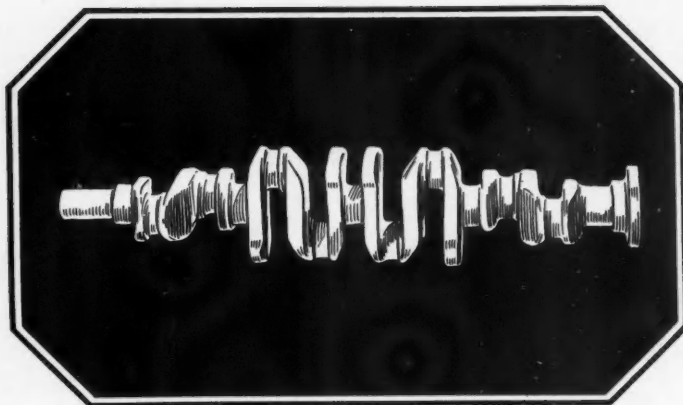
The foregoing touches but briefly on the highlights of the activities of one of the largest of automotive suppliers. It would be impossible to do justice to an organization of this size within the limited scope of a single article, for it would be essential to go into the details of every step of the operation.

However, we hope that the reader can get some perspective of the Bendix plant from the selected group of camera studies shown in generous number in this article. These, supplemented by the detailed factory routings, speak louder than words of praise to the production-minded individual.

Horizons of Business

(Continued from page 317)

of business activity. The truth is that our most tenacious vested interests are to be found not in the financial districts of large cities but on the payroll of the Federal Government.



Forgings with a background—

Behind every Wyman-Gordon forging stands diligent scientific examination of every bar of steel — continuous laboratory control of all processes.

WYMAN-GORDON
THE CRANKSHAFT MAKERS
Worcester, Mass. • Harvey, Ill. • Detroit, Mich.

Production Lines

(Continued from page 299)

Studebaker Party

One of the stellar attractions at the recent Studebaker preview, held at its proving grounds, was a cow milking contest. Honest, they had real cows. Roy Cole, Studebaker's chief engineer, gave a swell exhibition of versatility, proving beyond a doubt that an engineering training fits one for almost any kind of a job.

On the proving grounds, Paul Hoffman introduced newspaper men to Floyd Pryor, a stunt driver who can do anything with an automobile. For the edification of the crowds, he tried to roll one of the Studebaker cars, but a steep bank was not enough to do the trick. Then he took it into a three-foot ditch at about fifty. It rolled once. And it rolled again. A complete double roll that took our collective breath but didn't disturb Floyd. He came out smiling and drove the car out of the ditch under its own power.

Broaches Internals

Several days ago we saw a broaching tool in process that will be used for broaching internal gear teeth in a large ring. This is intended for a new transmission to be announced pretty soon.

Long Stroke

Vertical surface broaching machines are getting bigger and bigger. We saw one under construction the other day with a stroke of 66 in. In a few weeks you may see it turning out connecting rods in one of the prominent motor plants.

Forging Flash

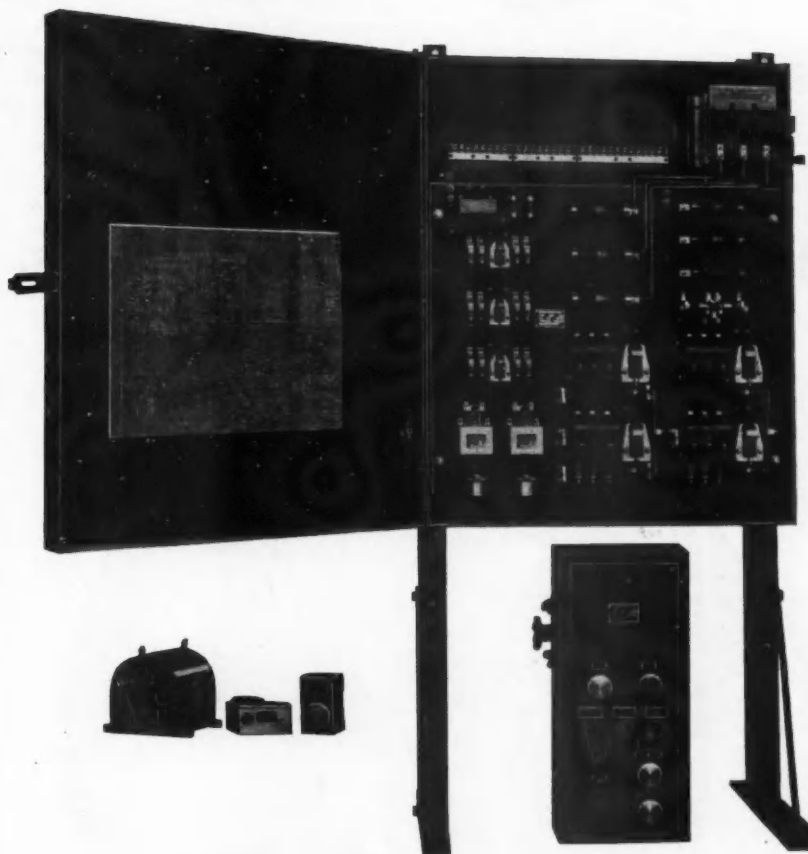
Maybe you have or have had a similar problem. We were told several days ago that one of the motor shops was having trouble broaching a certain forging. It was required to cut a groove along the parting line and no amount of work on the part of the shop and the broaching people succeeded in producing a chatter-free cut. The solution arose from the discovery that a cold flash was produced, accompanied by porosity and it was the porous condition of the metal that caused the tearing action. Hot forging and consequently a more uniform structure of the piece eliminated machining troubles.

Complex Broach

One of the most remarkable broaching jobs we have ever noted was drawn to our attention recently. Given a short

CLARK-SUNDH

Heavy Duty Industrial Control



A BRAND NEW IDEA

For the complete automatic control of large Power Presses, Clark has designed and built the above illustrated group of apparatus.

This group comprises:—

- (1) The Magnetic Control Panel with all necessary contactors and relays for the control of the main drive motor and of the air-operated clutch-brake equipment which operates the one or more individual motions of the press. This panel can be mounted at any convenient location remote from the press.
- (2) The Master Control Station, containing, in ONE unit, Push Buttons, Pilot Lights and Selector Switch for the remote control of the Main Drive, the Slide Adjustment, Inching and Emergency Stopping.
The regularly used "Start"-"Run" buttons are separately mounted. This Master Station may be mounted on or very near the press.
- (3) ONE drum-type Limit Switch takes care of all motions where a limit of travel is required.

This arrangement "dresses up" the Press as it deserves and makes it convenient for the operators.

The exclusive Clark Safety Anti-Repeat feature is, of course, included.

THE CLARK CONTROLLER CO.

1146 E. 152ND ST.
CLEVELAND, OHIO



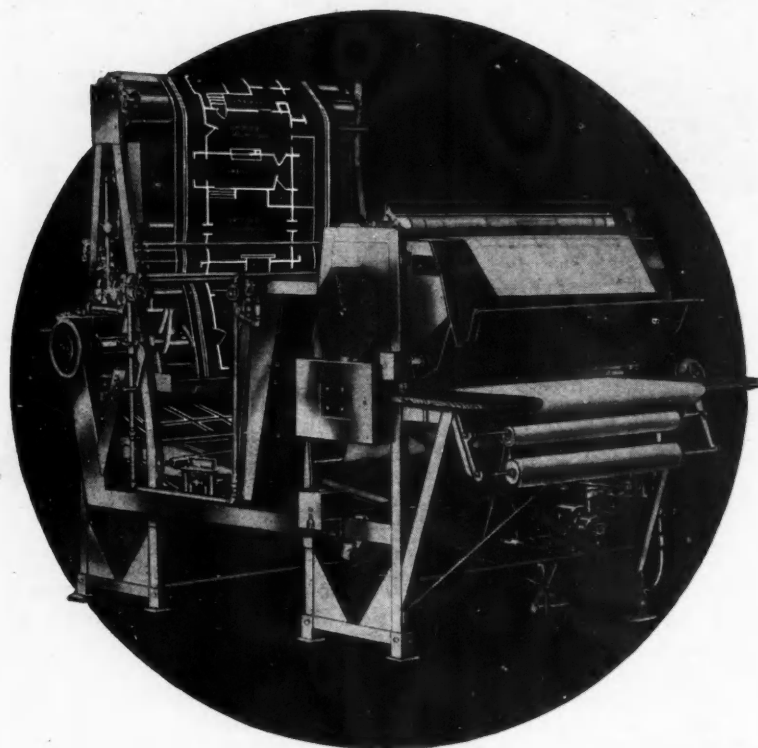
cylindrical piece with a drilled hole in the center—it was required to broach in one pass, first, two large diameter segments similar to the wing of the shock absorber; then two small diameter segments about the drilled hole. In addition, it was necessary to cut two spiral grooves in each small diameter segment. This description is perhaps too involved to give you the picture but you can see, at least, that the job was pretty complicated. Of course the greatest complication came from the requirement of the spiral grooves which meant a spiral action of the tool dur-

ing a portion of its advance. The broaching tool manufacturer who solved this problem was very happy to tell us about it.

Cuts Weight

By ingenious engineering redesign, one of the car builders has succeeded in cutting the weight of the transmission for 1937 by exactly one-third. Not only does this cut some 40 pounds off the weight of the chassis but think of the cost saving in nickel alloy steel and metal removal.

Better Blue-Prints at Lower Cost With This Modern Machine!



Here's one of the most outstanding developments in blue-printing machines—the Pease Model "11"—a machine that offers so much at such low initial cost and maintenance expense that you can no longer afford to make blueprints on old, obsolete equipment.

Talk about high quality prints—more economical production—more ease of operation

—well, here it is combined in one machine as never before.

Model "11" has a range of speed from 4 inches per minute minimum up to a maximum of 12 feet per minute and turns out prints perfectly printed, washed, and dried at lowest cost per square foot ever yet obtained.

Write for complete information and prices without delay.

THE C. F. PEASE COMPANY

835 NORTH FRANKLIN STREET, CHICAGO, ILLINOIS

THE PEASE MODEL "11"

Unified Design

A few years ago we visioned the possibility of a unified engineering program within a given organization which would result in carrying important manufacturing details interchangeably throughout an entire line. This year brings fruition of the idea. As you analyze many of the 1937 offerings, you will find that a single body is carried through two models or an entire line from the lowest to the highest price bracket. The same is true of many chassis units. It brings up a very interesting point—that today a certain concept of quality may be said to pervade and the lowest priced car in the group benefits by the quality standard set for the highest priced line. There has been no lowering of standards on the high priced cars BUT there is a higher standard for the lower priced jobs.

Colloidal Zinc

You probably recall Lubriplate which was discussed in this column some long time ago. This is a gear and chassis lube compounded with colloidal zinc, the latter having the unique property of coating metallic surfaces with a protective and self-lubricating film. All this is by way of saying that one of the car makers will lubricate all chassis leaf springs with this material before the spring covers are assembled. Road testing has demonstrated some remarkable performance due to the use of this material.

Practical Science

One of the most interesting of the scientific organizations we have visited in a long time is the Electronic Control Corp., of our Motor City. Here is a small group of scientific men specializing in the solution of baffling problems of production and laboratory control through the medium of every trick of radio amplification and electron tube. Within a relatively short time these men have done some remarkable things in automotive plants. And they are on the way to even greater developments.

Welding Grows

Many new welding machines are making their appearance in motor plants. Just recently we noted try-out installations of several fender welders and a very interesting gas tank seam welder. Oxy-acetylene as well as the arc also have their sphere of usefulness in next season's production. One important place is in the welding of chassis frames. We can tell you that there will be a lot of welding found on the 1937 frames.

Three Cheers

This year, in particular, the new car models will feature many improvements and new attachments contributed by the parts makers. Overdrives, a novel carbureter, a new universal joint, remote control of gear shifting, improved electrical systems, and a host of other things with consumer appeal—all are the product of unceasing toil on the part of the parts industry. And very much appreciated by designing engineers.

Cylinder Blocks

Judging by the early returns, nickel will give a good account of itself in the mixtures for cylinder block irons for 1937 production. Chrome-nickel and other nickel alloy irons will be very much in the picture, so far as may be seen at the moment. —J. G.

Safety Brake

"No Back" Device To Facilitate Starting On Up-Grades

Philip R. Wheeler of 3 Pine Street, Mt. Ida, Alexandria, Va., has invented and patented a so-called "no-back" device of which an illustration is shown herewith. It is based on the "wrapping" effect experienced in band brakes. The device is installed on the drive back of the transmission housing and is enclosed in a housing which may be either a part of the transmission housing or be secured to it. The brake itself runs in a bath of oil. The principle object of all such devices is to facilitate starting on rather steep up-grades.

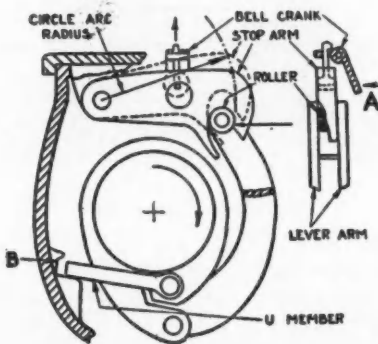
While the car is running forward, the clamp ring floats on the drive shaft and the pressure between clamp ring and shaft is practically limited to the weight of the clamp ring. Both ends of the clamp ring are pivoted to the lever and the friction between the clamp ring and shaft during forward

motion tends to spread the free ends of the ring. As soon as the shaft begins to turn in the reverse direction (backward motion of the car) the clamp ring grips the shaft firmly and immediately stops the motion.

In a device of this kind, provision must be made to render the brake ineffective when it is desired to back the car. The means employed to this end in this particular device comprise a bellcrank, a stop arm, and a pin and roller. Shifting into reverse moves the bellcrank in the direction indicated by the arrow at A and lifts the stop arm

as indicated by the dotted lines. The clamp ring is now free and turns backward with the shaft through a few degrees, until the U member ends up against the housing at B. This holds the inner end of the ring and permits the shaft to turn freely in the reverse direction. The surface of the stop arm with which the roller at the end of the lever arm contacts is a circular arc whose axis coincides with that of the pin which holds the stop arm, hence the stop arm rolls off from the roller readily.

It will be seen from the drawing



Clamp-Ring Safety Brake.

Automotive Industries

DERMA-SAN

D I S I N F E C T A N T



Prevent Oil Dermatitis
with **DERMA-SAN!**

YOUR MEN do better work when you sterilize cutting lubricants with Derma-San. For Derma-San keeps oil dermatitis out of your plant. By protecting your workers against this serious skin disease, it saves compensation and medical costs. By eliminating oil infections, it increases efficiency and production. Guard your men with Derma-San. Add 1 pint of Derma-San to 35 gallons of cutting lubricant, and kill pus-forming germs before they attack your workers.

Derma-San is ideal for all general plant sanitation.

The HUNTINGTON LABORATORIES Inc.

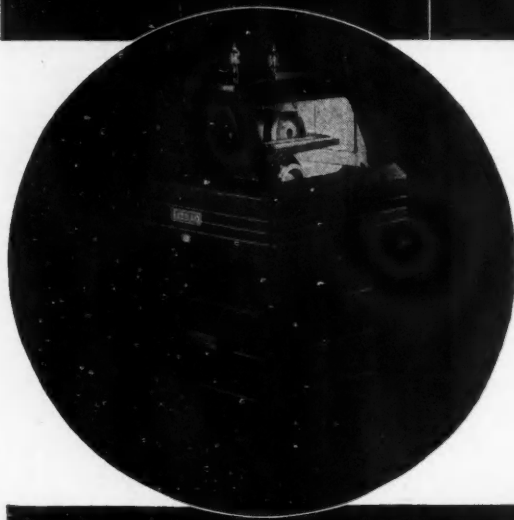
DENVER

HUNTINGTON, INDIANA

TORONTO

September 5, 1936

Production Insurance



With Ex-Cell-O tungsten carbide tool grinders you duplicate new tool performance at each sharpening. Produce accurate reproductions of tool shapes and sharper tools, with the removal of a minimum of tungsten carbide stock. Results—more pieces per grind, more sharpenings per tool, and lower cost. In actual use Ex-Cell-O carbide tool grinders have proven that they pay for themselves many times over. A type for every purpose. Complete information upon request.

EX-CELL-O

AIRCRAFT
& TOOL

CORPORATION

DETROIT,
MICHIGAN

September 5, 1936

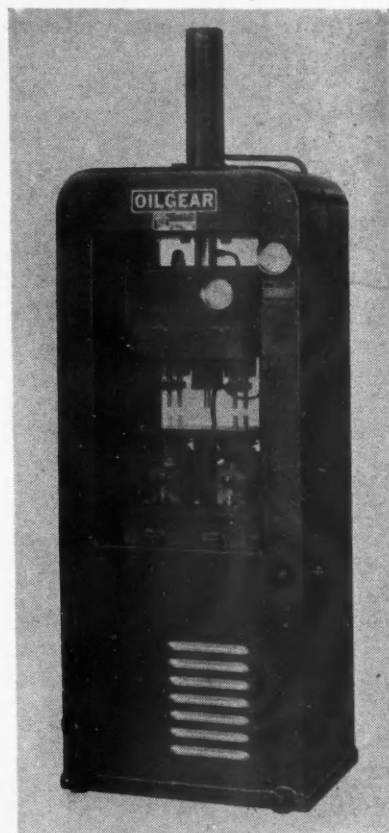
that the surface of the clamp ring has a helical thread-like oil groove cut in it, which extends over its entire width. An advantage claimed for this device over others designed to serve the same purpose, which comprise either ball or roller ratchets, is that the contact surface is much larger, which greatly reduces the unit pressure and makes it possible to use such common materials as cold-rolled steel or bronze without the risk of undue wear on the parts.

5-Ton Press

Machine Assembles Bushings On High Production Basis

Accurate assembly of plain valve guide bushings on a high production basis is the function of the new 5-ton, two-column Pushemall press designed and manufactured by the Oilgear Co., Milwaukee.

Reference to the illustration will clarify the following description of operation. For each press stroke four plain solid valve guide bushings are pressed into two air-cooled single act-



Oilgear 5-ton press

ing type gasoline engine cylinders. The operator loads the two cylinders in the lower fixture on platen and inserts solid valve guide bushings into hardened steel bushings on top of fixture. When the

Automotive Industries



The Craftsman's touch on a tonnage product

THE manufacture of the many different kinds of alloy steels used to carry the heavy burdens in industry and transportation calls for facilities that permit special handling, and the close supervision of master steelmakers, aided by elaborate apparatus for heat control.

In the Bethlehem Alloy Steel Plant both personnel and equipment measure up to these requirements in every particular. Here fine alloy

steels are turned out on a tonnage basis with the superlative quality that can be obtained only by the painstaking care of highly skilled craftsmen.

Bethlehem Alloy Steels are well fitted for positions of high responsibility in automobiles, aircraft, locomotives, oil-refining and chemical plant apparatus, mining machinery or other applications.



STEELS

that

facilitate

Motor Vehicle

Production

SHEETS AND STRIP

In Bethlehem's new continuous sheet, strip and plate mill all possible refinements for hot-rolled and cold-rolled sheets and strip for which there is any commercial demand are provided, and at the same time the mill is equipped to roll and finish light plate up to one-half inch in thickness.

Wide strip up to 60 inches in width by 0.0625 inch in thickness and 72 inches in width by 0.078 inch in thickness, with a minimum width of 18 inches by 0.05 inch in thickness, can be continuously hot-rolled in one heating in the new Bethlehem hot mill.

Cold-rolled strip is produced by Bethlehem in a range from 18½ inches to 72 inches wide and from 0.0125 inch in thickness for narrow widths up to 0.109 inch in thickness. By cross-rolling in the 93-inch, 4-high, skin pass mill sheets may be rolled up to 84 inches in width.

ALLOY STEELS

A CLOSE liaison that has been long maintained by Bethlehem with automobile metallurgists plays its part in the production and development of Bethlehem Alloy Steels. They consistently meet an ever more insistent demand for lighter, stronger metals, essential to more dependable and economical automotive transportation.

While Bethlehem Alloy Steels bring greater strength and durability, this close-working relationship with the industry has also often been of assistance in developing properties that simplify heat treating, facilitate machining or effect other economies.

SILVERY MAYARI ALLOY IRON

A NATURAL nickel-chromium alloy iron with a high silicon content, offering a simple, economical method of making fine-grained machinable alloy-iron castings.

SPECIAL-PURPOSE CARBON STEELS

EFFICIENT metallurgical control in melting and heat-treating as well as accurate control of rolling temperatures give Bethlehem Carbon Steels suitability to a wide range of responsible tasks. Special-Purpose Carbon Steels, as Bethlehem makes them, have strength and fatigue-resistance combined with easy machining qualities that make them the logical steels for an increasing list of automotive applications.

STAINLESS STEELS

BETHADUR and Bethalon cover practically every requirement for stainless steels, including the free-machining grades.

TOOL STEELS

EVERY detail in the manufacture of Bethlehem Tool Steels is handled in the way that long experience has shown to result in the finest product. For each of the many exacting tool steel uses in the automotive industry there is a grade of Bethlehem Tool Steel that will meet every demand.

STEEL WIRE

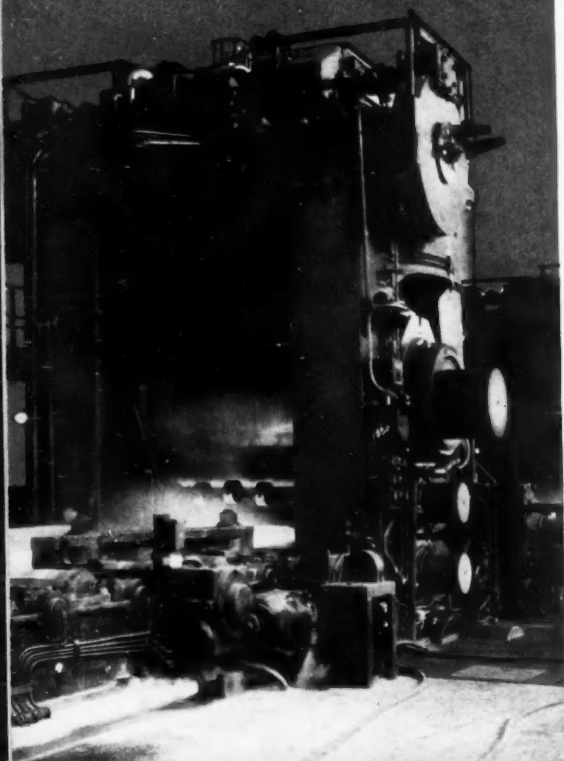
BOLT and screw wire; spoke wire, spring wire.

ROLLED SECTIONS

SPECIAL rolled sections developed by Bethlehem can be used with decided savings in the manufacture of a wide variety of parts. The use of these sections, many of which have been designed for automotive parts, has brought economies to many manufacturers.

BOLTS AND NUTS

BETHLEHEM's large, self-contained Lebanon Plant is devoted wholly to the manufacture of bolts, nuts and related products, and produces a complete range of standard items, and many "specials."



BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa. District Offices: Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York. Export Distributor: Bethlehem Steel Export Corporation, New York.

control lever is moved forward the first half of stroke raises the disappearing pins to locate cylinders, while the second half of stroke actuates the control valve so crosshead moves downward to "press home" the valve guide bushings. Positive stops limit the crosshead stroke to accurately maintain depth to which bushings are pressed.

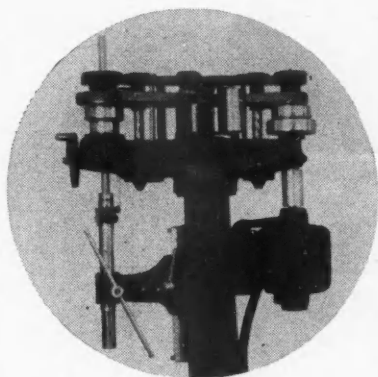
Built into the fixture attached to the crosshead is an automatic hydro-electric tell-tale which shows a red light when the press fit for any bushing is not in accordance with predetermined specifications.

Motor Drive

Foot-Burt Arrangement Gives Three Speeds

A new type of motor drive for the "Footburt" Sipp Sensitive Drilling Machines has been developed by the Foote-Burt Co., Cleveland, O.

This new drive consists of a stand-



Foote-Burt motor drive

ard foot mounted ball-bearing motor supported on a bracket at the rear of the machine. The motor armature shaft is connected to the rear cone pulley drive shaft by a flexible coupling which makes a short, compact drive and provides three spindle speeds of 1035, 1725 and 2915 r.p.m.



Reed-Prentice spindle nose

Automotive Industries

Spindle Nose

Work Mounting Facilitated By Reed-Prentice Device

To facilitate accurate placement of chuck, face plates, etc., designers for Reed-Prentice Corp., Worcester, Mass., have produced a new spindle nose for the 14 in. and 16 in Model "AA" sliding gear head engine and Model "B" tool-room lathes.

Construction includes a long hardened taper bearing for alignment and a safety key for holding. This key permits plates or chucks to be hung on the

spindle allowing the operator both hands to start and tighten the collar. The key also brings the thread in the collar into immediate alignment with that on the face plate or chuck.

Borg-Warner Extra

Directors of Borg-Warner Corp. have declared the regular quarterly dividend of \$1.75 per share on the preferred stock, a quarterly dividend of 75 cents per share on the common stock and an extra dividend of 75 cents per share on the common stock, all payable on Oct. 1 to stockholders of record at the close of business Sept. 15.

THE SOLID SHIM THAT P-E-E-L-S FOR ADJUSTMENT

mesh of gears

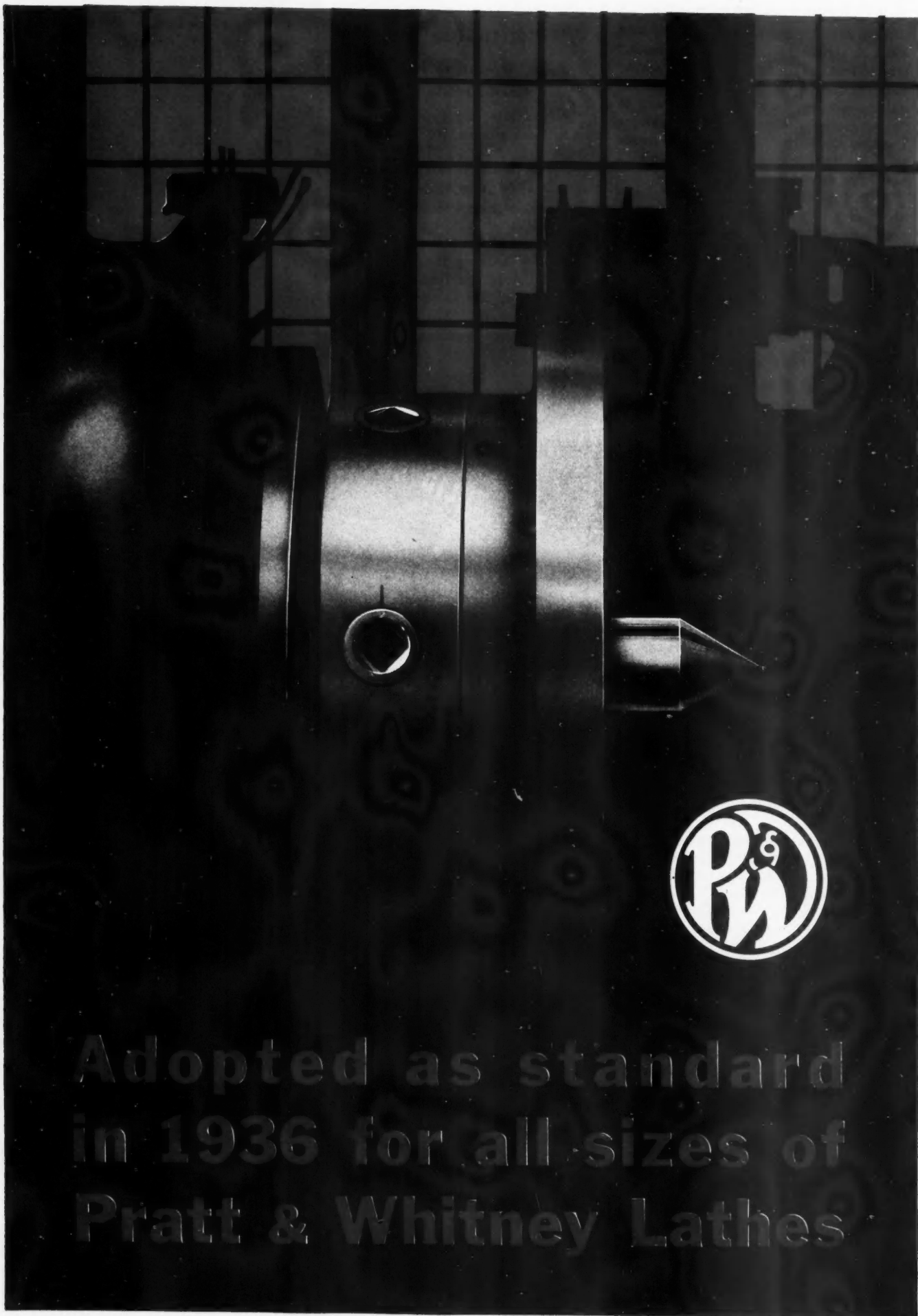
THE SAME LAMINUM SHIM that saves precision machining, fitting, and factory assembly costs, gives users an easy, accurate service adjustment feature for the life of the equipment.

YOU SIMPLY PEEL your adjustments . . . one or more laminations at a time . . . from the solid laminated shim! Write for a sample of LAMINUM . . . either .002 or .003" laminations.

LAMINUM
Precision adjustment SHIMS

LAMINATED SHIM CO., 21-30 44TH AVE., LONG ISLAND CITY, N. Y.
CLEVELAND DETROIT MILWAUKEE

September 5, 1936



Adopted as standard
in 1936 for all sizes of
Pratt & Whitney Lathes